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Book of the Navy

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The Times

BOOK OF THE NAVY

WITH A PREFACE BY

ADMIRAL LORD CHARLES BERESFORD,

G.C.B., G.C.V.O., M.P.

SIXTEEN ILLUSTRATIONS.

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PREFACE.

The Times "Book of the Navy" is a most interesting compilation. It is a work that all should study. It illustrates how vital it is for us to retain the command of the sea, if the British Empire is to continue.

Reference has been made to the separate duties of the Naval and Military Services; they really are one, as each is dependent upon the other for the successful ending of any campaign. The Navy must keep the pathways of the sea inviolate or the transport of armies could not be effected. It is also responsible for the certain and punctual delivery of food and raw material, without which an Army could not be fed or clothed. Fleets, like armies, are made up of component parts, any one of which being weak or ineffective will jeopardize the whole. The links of a chain afford a parallel. *The Times* book deals in a clear and seamanlike manner with each class of vessel of which a modern fighting Fleet is formed.

I do not propose, except incidentally, to speak of what has been, only what is. The modern mind must grasp things as they are and not as they were. We do the same things with a Fleet now as were done in days gone by, but we utilize machinery in lieu of manual power, and our motive power is steam or electricity in

lieu of the action of the wind on spread canvas. Seamanship remains. The art of handling Fleets and ships in rough weather, fogs, shallow water, and under difficulties and disasters is as perfect as in the old days of sailing ships. There is, perhaps, no profession that exhibits the characteristics of British adaptability so markedly as the seaman's. Although the implements for attack are entirely changed, the same vigilance, readiness of resource, independence of action, grit, pluck, and good comradeship exist as in days gone by, but the man behind the gun and the officer who leads him have the advantage of being far better educated than heretofore.

Tactics and strategy are referred to in this able book. Here again one art is largely dependent upon the other for success, but a man may be a brilliant tactician and a bad strategist. Similarly, a man may be a brilliant administrator but a bad executive. An officer who has all four qualifications is a genius. Strategy consists in having the right number of vessels composing a Fleet in the right place at the critical moment. A bad tactician may throw away this palpable advantage. Every vessel attached to a Fleet should be built to carry out certain defined duties. Before the advent of the War Staff these duties were not made out in detail. There was no business plan, no reason why. A panic would cause at one time a number of battleships to be laid down, at another time a number of t.b.d.'s or cruisers; there was no systematic scheme drawn up to settle what was wanted to make up all the component

parts that form a modern Fleet. The War Staff is only advisory, but it keeps on advising all the time.

The result of this lack of plan was that Fleets were often short of those units which are necessary to secure complete success in an action. If the Fleets had their proper complement of cruisers, the Empire's arteries (the trade routes) were unprotected. If the trade routes were properly protected the Fleets were short of cruisers. The present war affords an example. By unhoped-for good luck the Military Bureau at Berlin rushed their nation into war. The Naval Bureau cannot have been consulted. Good strategists consider not only what is *likely* to happen, but also what *may* happen. The German Admiralty were probably informed that Great Britain would not, or could not, take part in the war, but the Naval Bureau would have made arrangements in case Great Britain *did* take part. The characteristics of the Irish race were forgotten by the Germans. If time had been given, armed merchantmen would have been sent to localities on every British trade route before war was declared. The result would have been terrific; the news during the first few days of war would have been appalling. British merchant ships would have been captured or sunk in all parts of the sea excepting the few lately armed; shippers would not have shipped in time to fill up the gap caused by these disasters, and no rate of insurance could have prevented the dislocation of our water-borne traffic in food and raw material. The Germans missed their real chance against us. A chance should never be missed; it may never come again.

Incidentally it may be mentioned that we had another great stroke of luck. Some months previously a partial mobilization of the Fleet had been ordered for the end of July for an inspection by his Majesty. Of the many Fleet Reviews held since I joined the Service in 1859 this last was the *only one* where every vessel was efficient and every vessel was properly manned. At present we hold "the command of the sea" as against Germany, but it is idle to deny that this command was brought about by an unprecedented piece of good luck, particularly with regard to what might have occurred on our trade routes. However, luck or no luck, we hold the field.

The Germans hope to reduce our Fleet by a process of attrition, brought about by mines, submarines, torpedo attacks, and air vessels. Our margin of ships, though large, is none too large to meet losses and supply reliefs. If we had carried out a large constructive programme in 1909 it is more than likely that we should not have been at war to-day. Ententes would have been unnecessary, and it is doubtful if the neutrality of Belgium would have been impugned. Prince Bismarck said to me in 1889, "If the British Fleet is overwhelmingly strong it becomes the dominant factor for peace in Europe."

Reference is made in the book to the evolution of the modern navy from 1860 to 1900. Naval officers gratefully acknowledge what the State owes to the brain power, skill, and marvellous mechanical knowledge and intuition of ship constructors and marine

engineers, without whose untiring zeal and trained ability the fighting efficiency of the modern fleet could never have been obtained. It must, however, never be forgotten that no matter how efficient the *matériel* may be, it is the personal element that wins. The country is proud to recognize that the personal element of modern days has had no superior in the naval days of the past. The strain and anxiety thrown on the *personnel* are infinitely greater now. Under sail power there was much to occupy the minds and keep the health of the ships' companies ; now in war time they must lie at their guns "toujours prêts." In the old days there was no under-water warfare—mines, submarines, torpedo craft (nerve-racking devilments). But though the strain is far more acute, nervousness is no more apparent in the Fleet than of yore. The success of under-water warfare, as represented by submarines and t.b.d.'s, entirely depends upon the health and vigour of the officers and crew, and constant reliefs are necessary to maintain intact this vigour. I am of opinion that we should have more t.b.d.'s ; they do not take long to build and equip. A rapid and accurate line of communication is essential for an admiral to ensure "getting there" at the critical moment ; t.b.d.'s and air craft, with wireless, can supply this necessity, and we should be well equipped with both such craft. The new class of small cruiser, the "destroyer of destroyers" advocated in 1909, is a tremendous advance in the fighting efficiency of the Fleet, and the late action of the "Saucy Arethusa"

(the first of the class) has amply proved the wisdom of building these vessels.

The submarine is a new and a deadly weapon, but I do not think that it will revolutionize naval warfare. It has many disadvantages. When submerged it is in a fog, the one element that beats a seaman. It is never certain when it rises whether it will come up miles away or close to an opponent. Its scantling is so light (to gain buoyancy) that a touch below or above water sinks the vessel. At present it can only fire its torpedo bows on. It may unintentionally sink a friend instead of an opponent. It is not a blue-water vessel. Its power must not be underrated; equally it must not be overrated.

The Fleet auxiliaries are of immense importance to its efficiency, and of late years this has been thoroughly recognized. One of the first duties the War Staff undertook was to look into and organize the proper service of auxiliaries. Mine layers and mine clearers are another essential to a modern fleet. The steam trawlers have done brilliant work in the present war as mine sweepers. Trawler crews are accustomed to handle the bottom of the sea, and never foul their screw. The adoption of these vessels was recommended in 1908.

The chapter on *personnel*, training, and discipline is interesting. It should be mentioned that the old system of maintaining discipline by condemnation is being replaced by a system maintained by commendation. The feelings and sentiments of officers and men towards each other leave nothing to be desired in modern days. The improvement in this respect is undoubted.

The organization and exercises of the Fleet are really the basis of the great tactical school. Captains should handle the Fleet as a whole as well as command squadrons; this trains not only the captains but the Commander-in-Chief as well. All the vast expense, training, and organization of the Navy are for a definite object, to be ready at the critical moment when the fate of the Empire is to be settled one way or the other. Success will be won by the best tactician. Admirals should *begin* their commands young; it does not matter how old an admiral may be, provided he is sound in health and has *commenced* his experience of handling and administering a fleet when young. No admiral should be given command of a fleet unless he has been second in command (commander or first lieutenant) of a ship; there he learns the art of handling men, upon which depend entirely the comfort, happiness, and discipline of a fleet.

"How the Navy is governed" is a puzzle to the country and has often been a wonderment to the Navy itself. The problems are vast. The best system is that expressed by the phrase, "My Lords Commissioners of the Admiralty." The worst system, as has been repeatedly proved, is that which allows either the civilian head or the Naval Chief to be autocratic with predominant power. The Government of the Navy is most complex. Different ideas and schools of thought, different experiences, inseparable from life at sea, rapid increase of new inventions to carry out old duties, the strong temperament and individualities created by the

hard practical life of a naval man (the Navy always being on active service, the sole difference between war and peace is represented by the target in war returning the fire) all react against the dominance of an individual at the Board. The Board should be a board; each member has his own separate duties and responsibilities representing yarns or strands of a rope. The First Lord's business is to weave all these yarns or strands into a rope; if either he or the Naval Chief makes himself into the rope every department in the Service suffers. The First Lord's business is to make out with the Cabinet the naval policy; the Sea Lord's business is to make provision in ships and men to enable that policy to be carried out. If either the First Lord or the Sea Lord lays down the law in each other's domain, failure in the government of the Navy is certain. How the Navy ever carried out its duties without a War Staff is a marvel; it could only have been done by the superb loyalty of those afloat, who have always done their best and never allowed the word "impossible" to exist. We have had no naval war that threatened our existence for over a century, but if such a war had occurred any time in the last 40 years preceding the creation of the War Staff our disorganization would have been complete. There was not even a proper plan of campaign before the War Staff was instituted. The one imperative necessity for success in fighting is to organize all details beforehand, decide where you are going and what you will do when you get there, and take the number of vessels of all classes necessary. The Beresford

Committee of 1909 proved up to the hilt the unreadiness of the Fleet if a sudden war had been declared. The creation of the War Staff has removed this danger.

I miss any mention of the pay of the officers and men, which is totally inadequate for modern requirements. The new separation allowance during war should be made permanent.

The Naval Service has maintained its brilliant traditions as far as the present war has proceeded; the "unflinching courage and self sacrifice" lately exhibited in the losses we have already sustained are a glorious proof. It will have to endure more trials, possibly in the near future. It is unwise to underrate an enemy. The British are curiously optimistic in this respect. The Navy will maintain the same calm dignity either in victory or temporary reverses. The country trusts the Navy, knowing that splendid Service will never fail in its duty.

CHARLES BERESFORD,
Admiral.

28th September, 1914.

NOTE.

This work deals mainly with the Navy in its statical aspect; that is, it describes the Navy as it stands and treats only incidentally and very sparingly of the operations it undertakes in time of war. For a survey of the Navy in this its dynamical aspect, the reader may be referred to the excellent little manual on "Naval Warfare" by Mr. James R. Thursfield, which was published last year by the Cambridge University Press. The two works may thus be regarded as complementary to each other, and the conductors of *The Times* feel bound to say this much, lest it should be supposed that the present work is intended to supersede that of Mr. Thursfield. They would add that they are indebted to Mr. Thursfield for much valuable assistance in the preparation of this work.

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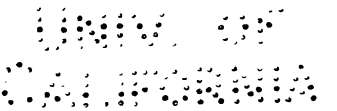


CHAPTER I.

THE NAVY:

WHAT IT IS, AND WHAT IT HAS TO DO IN WAR.

THE NAVY AND THE SEA—WAR ON LAND AND WAR AT SEA—AMPHIBIOUS WAR—SEA POWER—CHARACTERISTICS OF THE SEA—NAVIES AND COMMERCE—THE SEA AS A HIGHWAY—ELEMENTS OF NAVAL FORCE—BATTLESHIPS, CRUISERS AND TORPEDO CRAFT—COMMAND OF THE SEA—WHEN ABSOLUTE AND WHEN NOT—ILLUSTRATIONS FROM PRESENT WAR.

A NAVY is the agency, and ships are the instruments, by which war is waged on the sea. War on land and war on the sea differ in many respects, but they have this one vital characteristic in common, that the supreme object of both is the overthrow and, if it may be, the destruction by one belligerent of the armed forces of the other. This object is sometimes pursued in common by both arms, that is by Navy and Army

combined, as in the reduction of a naval fortress by the concerted action of troops on land and ships at sea, or in the covering by a fleet of an invading force in transit and the maintenance of the sea communications of such a force after it has landed. It is in conjunct operations such as these that sea power—that is, the power of offence and endurance which superiority at sea gives even on land to the belligerent who possesses it—attains its highest manifestation. The combination of land and sea forces is rather organic than merely mechanical, and its effects on the ulterior issues of the war may often appear to be out of all proportion to the means employed to attain them. For this reason it is not always possible, nor is it often very profitable, to disengage the influence and bearing on the common result of one of these factors from those of the other. In such cases it is often misleading to say "the Navy did this and the Army did that." All we can say is that both contributed in their respective degrees and according to their special characteristics to the final result.

Nevertheless the Navy has its own work to do and its own way of doing it, and it is with these that we are here specially concerned. It operates on the sea and not on the land, and it is only exceptionally that it operates from the sea against the land. It is with the armed forces of the enemy afloat and with their destruction that it is primarily concerned. Now the sea differs from the land in several fundamental respects. In the first place it belongs to no one, neither in

sovereignty to any State, nor in possession to any private owner. The sovereignty of any State extends over the sea only to a distance of three miles from the low water limit of its shores. Beyond that narrow margin the sea is the common highway of all who embark on its waters. In fact, apart from its fisheries, which outside the territorial limit of three miles are open to all mankind, it is of no use to anyone except as a highway. But its use as a highway is one of the most dominant factors, perhaps, indeed, the one predominant factor, in the economic welfare of mankind. A nation which depends to any considerable extent on sea-borne commerce for its supplies of food and of the raw materials of its industries, and for the consequential exchange of its own industrial products with those of other nations across the seas, must sooner or later be reduced through economic destitution to submission if all access to the sea is denied to its ships. Britain is pre-eminently such a nation, since no foreign merchandise of any kind can reach it or leave it except across the sea.

Now the sea being a highway and for Britain the sole highway for the foreign commerce which is her life-blood, we must at all costs not only keep that highway open, but keep it open so effectively and so securely that the cost of transit shall not be so enhanced by high rates of insurance on freights and bottoms as to extinguish all the profits of shippers and merchants engaged in the undertaking and to leave them saddled with a loss. Such a loss could not be recouped, except

within very narrow limits, by a rise in the selling price of the commodities imported, because that in its turn would, as regards raw materials, extinguish all the profits of the manufacturers at home and restrict their sales abroad, while, as regards food, it would raise its price to a level with which the impoverished and unemployed millions of our poorer fellow-countrymen would have no wherewithal to cope. For this reason the insecurity of the seas would, if sufficiently pronounced and prolonged, have precisely the same effect on the economic condition of the nation as if our merchant ships afloat were one and all captured or destroyed by the enemy. It is only by rendering the seas secure in war that our industries can be sustained and our people fed. That, then, is the first, foremost, and primary business of the Navy—to keep the seas open and to render our maritime commerce secure. It is in this sense that we must read and interpret the time-honoured preamble of our naval Articles of War—"It is on the Navy, under the Good Providence of God, that our Wealth, Prosperity, and Peace depend."

But not only is the sea a highway, it is all highway, and herein, as regards warfare, lies another of its great differences from the land. Wherever throughout the seas a ship can float there a ship can pass, and there if she is a friendly ship she must be free to pass, while if she is an enemy ship, whether warship or merchant vessel, she must, if possible, be stopped. In land warfare victory is obtained by the occupation of the enemy's territory, by the overthrow or destruction of his armed

forces, and by the consequent appropriation of his national powers and resources. Hence the armies of belligerents on land move on certain definite lines towards certain definite objectives within the territory of one or the other, such objectives and the lines of communication leading to them being determined by the strategic conditions of each particular case, but always lying within the territory of one belligerent or the other. At sea there is no such definite objective similarly conditioned. The sole objective is the armed forces of the enemy afloat, and these, whether dispersed or concentrated, may at any given moment be here, there, or anywhere, or indeed nowhere within the reach of the belligerent who seeks to assail them. For here, again, there is a third fundamental difference between war on land and war at sea—namely, that on land the armed forces of one belligerent can always be assailed by those of the other, whereas at sea one belligerent can always withdraw his armed forces from direct attack by placing them in ports so strongly fortified as to defy assault from the sea. When that is done it might be thought that the game is up for the belligerent who shrinks from facing his adversary at sea. But the problem of naval warfare is not quite so simple as that. Naval forces are composed of different elements each with distinct but sometimes overlapping functions to discharge, as will be shown in detail in subsequent chapters of this work. Here it suffices to say that the three primary elements of naval force are battleships, cruisers large and small, and torpedo craft of all kinds,

including submarines, together with their attendant depôt ships and other needful auxiliaries. These three elements are for war purposes organized in definite relations one with another, battleships being the central core and nucleus of the whole organization, but seldom, except in actual conflict, in such immediate contact with the enemy as the other two. A battleship is the chief component unit of a main fleet. It has been variously designated from time to time as a "capital ship," a "ship fit to lie in a line," a "ship of the line," a "line-of-battle ship," and, all too briefly a "battleship"—for the word "line" is much more essential to its proper definition than the word "battle." Its function is to act in concert with other battleships, and so acting in concert in a main fleet to encounter a main fleet of the enemy, on such terms of mutual support and cohesion between the several units, of skill in the handling of its weapons, and, if possible, of numerical superiority as may by the blessing of Providence and the skill of a good admiral give it and its consorts the victory in the conflict. Numerical superiority is not always necessary to victory, though, other things being equal, it is always a very great assurance of decisive victory. The essence of all victory is, as has been said, to be at the right place at the right moment and in superior force. But this is often much more a question of tactics than it is of numbers. Tactical skill may often give a local superiority at the critical point and moment, as Nelson showed at Trafalgar when by the consummate skill of

his dispositions he vanquished the Allied Fleet of 33 ships of the line with 27 ships of his own. Still, we must never forget that it was Nelson himself who said, "Numbers only can annihilate."

The so-called battle cruiser is, as its designation implies, something of a hybrid, being on the one hand quite "fit to lie in a line," and on the other exceedingly well qualified to discharge many of the functions of a cruiser proper. It has the speed of a very fast cruiser combined with the armament and armour, both slightly, but not perhaps unduly, reduced of a battleship. We shall perhaps best conceive its functions in the line of battle by recalling the tactical disposition projected—but for lack of numbers not carried out—by Nelson at Trafalgar, when he declared his intention of "placing the fleet in two lines of 16 ships each, with an advanced squadron of eight of the fastest sailing two-decked ships, which will always make a line of 24 sail on whichever line the Commander-in-Chief may direct." More will be said on this point in a subsequent chapter. On the other hand, its function as a cruiser does not seem to differ essentially from that of other cruisers properly so-called, except in the measure of its greater force. This function must now be briefly considered. The cruiser proper is either an armoured cruiser, a protected cruiser—protected, that is, by an internal armoured deck covering its vitals, but not by vertical armour on its side—or a light cruiser of such moderate displacement that it can carry very little armour, if

any, either vertical or internal. It is employed either singly or in organized squadrons to patrol the seas far and wide, either for the purpose of gathering and transmitting to headquarters information of the enemy's movements and whereabouts, or for the still more important purpose of keeping open the ocean highways and clearing them of such of the enemy's cruisers as may be endeavouring to molest, attack, and interrupt their adversary's commerce afloat, and thereby of affording safe conduct to the latter. These two functions are in practice generally combined, just as Nelson acknowledged that his frigates, dispersed throughout the Mediterranean for the protection of British trade, were for the most part not ill-placed for the collection of information concerning the enemy's movements. But of course the collection and still more the transmission of such intelligence was a much more difficult matter in those days than it is in these when wireless telegraphy has practically annihilated time and space. In this respect the modern cruiser and the fleet which it serves enjoy an enormous advantage over the frigates and fleets of the past. A third function of the larger cruiser, armoured and protected, is to afford adequate protection and support to the light cruisers and torpedo craft employed in maintaining as close a watch as is practicable on the ports which shelter the armed forces of the enemy, with intent to make sure that none of his small craft can come in or go out without being challenged and, if it may be, impeached, and none of his larger craft can come out without being observed, shadowed,

attacked with torpedoes if opportunity offers, and in any case instantly reported to the supporting cruisers astern of the advanced guard off the ports and from them to the headquarters of the battle-fleet itself. This is at once the most vital and the most hazardous function which light cruisers and flotillas of torpedo craft have to perform. Another function scarcely less hazardous and certainly not less exacting is that of patrolling our own coasts for the purpose of frustrating the attacks whether on sea or on land of such vessels of the enemy as may elude the vigilance or have warded off the assault of the advanced guard off his ports, to make short work of his transports if he ventures to send troops across a sea over which he exercises no effective control, and incidentally to afford protection and security to the coastwise traffic of our merchant vessels. A fourth function, on occasion, is to take part in the conflict of battle-fleets themselves, for it is one of the characteristics of modern naval warfare that the battleship enjoys no immunity from the attack of torpedo craft. But that is a function which can only come into operation when the enemy's battleships are at sea.

We have now briefly sketched the organization and dispositions which enable a Navy to discharge the apparently impossible task of keeping open the trackless highways of the sea. This is commonly called, in technical phraseology, securing "the command of the sea," and if that expression be used it may be said with truth that the one sole paramount and all-sufficing

object of all naval warfare is to secure the command of the sea. When that is done all is done that naval warfare. as such, can do. If ulterior objects are aimed at, such as the subjugation of all the enemy's armed forces on land as well as at sea, they must be pursued by the conjunct operation of both arms, not by the operation of the naval arm alone. The direct power of the sea ends with the shore; its indirect power may extend to every nook and corner of the field of conflict. The Navy may carry the Army on its back as far as the shore, but there its direct action must cease, except in so far as both may act in concert within the range of the Navy's guns at sea, or the Navy may support and preserve the Army by keeping its sea communications open. Thus by another route we come back to the fundamental doctrine that the primary duty of a Navy is to keep open all the highways of the sea to counter and engage all the armed forces of the enemy which seek to molest these highways in any part of the world, and if the enemy shirks the supreme conflict by keeping his capital ships in port, to wait—until doomsday if need be—in constant and instant readiness to engage him whenever and wherever he plucks up his courage to try conclusions in the open.

This is what a Navy like our own has to do, In the foregoing exposition the time-honoured phrase, "command of the sea," has been deliberately eschewed, and this for two reasons. In the first place the phrase has become so hackneyed of late and has so often been used in various inaccurate and misleading significations

that it seems better not to employ it at all but to substitute for it some more intelligible and less ambiguous expression such as the keeping open of the highways of the sea or, if it be preferred, the control of maritime communications. Secondly the phrase, even when correctly used, is subject to a certain inherent ambiguity. We must distinguish between a command of the sea which is absolute and one which merely exists *de facto* at any given moment. An absolute command of the sea can only be secured by one belligerent if and when all the armed forces of the enemy capable of challenging it have been destroyed or put out of action. Taking the naval situation as it stood during the first few weeks of the present war as an illustration, we may point out that no such command had at that time been secured by either belligerent. It is true that as between Britain and France on the one side and Germany and Austria-Hungary on the other a *de facto* command, all but complete, had been secured by the former and forfeited by the latter. As between Germany and Russia in the Baltic, on the other hand, the command of the sea was certainly still in dispute. It was not even *de facto* established by either side. Germany ran a tremendous risk when, as was alleged, she sent troops by sea from Kiel to Memel; and Russia would have run a risk equally tremendous had she attempted to send troops by sea to any part of the Baltic coast of Germany. Thus we had at the same moment a command of the sea in dispute in the Baltic and a command of the sea *de facto* established but not absolutely secured in all the

other seas of the world. It was not absolutely established, because the German Fleet still existed and could not be engaged so long as it hugged the shelter of its ports. It is true that the British Fleet "plucked its feathers little by little," as Howard said of the Armada, but they were only its tail feathers, so to speak. Its wings were pinioned, not clipped. Its capital ships, so far as was known, remained intact, and they might at any moment have come out and put their fate to the touch. The Allied Fleet could only say with Nelson, "Every opportunity has been offered to the enemy to put to sea, for it is there that we hope to realize the hopes and expectations of our country."

Moreover, it is not to be hastily assumed that the enemy's reluctance to face his foes was due to a conviction on his part that he was no match for them. No Englishman could doubt that such a conviction would have been exceedingly well-founded, but it was not at all likely to have been entertained by a nation which had lavished such gigantic efforts on the preparation of its fleet for the conflict. It was far more likely that the German capital ships were being retained in port in pursuance of a definite strategic policy, and not through a salutary fear of the fate which might have awaited them outside. Be it remembered that Germany was waging a war on two fronts both by land and sea. She could not neglect the Baltic lest the vast and controlling power of the sea should pass in that sea from her hands into those of Russia. Hence she could not appear in full force in the North Sea unless she had annihilated the armed forces of Russia in the Baltic, and unless

she could appear in full force in the North Sea her chances of victory or even of escaping a crushing defeat would have been infinitesimal. The aim of her own naval policy had been, as she had frankly avowed, to "possess a battle fleet of such strength that even for the most powerful naval adversary a war would involve such risks as to make that Power's own supremacy doubtful. "For this purpose," she had been good enough to explain," it is not absolutely necessary that the German Fleet should be as strong as that of the greatest naval Power, for as a rule a great naval Power will not be in a position to concentrate all its forces against us." Such a rule sometimes cuts both ways, it would seem. The irony of the situation we are considering was that the rule to which Germany appealed so confidently was operating in favour of the Allies and against Germany. England and France were concentrated in the North Sea in force sufficient to cope with all emergencies. Germany was not concentrated there, and could not be so long as Russia held her at grips by land and sea in the Baltic. In the meanwhile her hope apparently was that the activity of her torpedo craft, and the ubiquity of the mines which she had sown so widely in the North Sea, might in course of time so reduce our overwhelming superiority as to give her at least a fighting chance of victory. But the activity of torpedo craft was soon found to be a game which two could play at, and the greater success in it generally goes in the long run to the superior naval force. As to mines, they are almost an equal menace to friend and foe, and it has happened more

than once in recent wars that the engineer of these hellish implements has been hoist with his own petard.

Thus it came about that within a few days of the opening of the war the power of the sea was manifested to a stupendous and unprecedented extent. It is true that the German Fleet could not be brought to a decisive engagement, but that was only because the German Fleet had so far taken very good care to run no such risk. But everything else which a Navy can do was done. Of such of the enemy's forces as he ventured to send to sea our Navy plucked the feathers little by little, though not without losing some feathers of its own as was, of course, to be expected. It had driven German maritime commerce from the seas and given British maritime commerce such adequate security that for the most part it could traverse the seas with very little more risk than it incurred in time of peace. Above all, it had covered the transport to France, without the loss of a man, a horse, or a gun, of the largest Expeditionary Force which this country ever sent abroad, and it had secured in like measure from day to day the safe and continuous transport of reinforcements, ammunition, and supplies. There is nothing very dramatic about this—none of the glamour of a decisive and resounding victory. But there is something solemn, something even sublime, in this swift and silent manifestation of the all-pervading, all-compelling power of the sea. There is nothing new in it to the student of naval history. But all to whom the Navy and its history are as a sealed book should mark, learn, and inwardly digest the lesson it conveys.

CHAPTER II.

THE EVOLUTION OF THE MODERN BATTLESHIP.

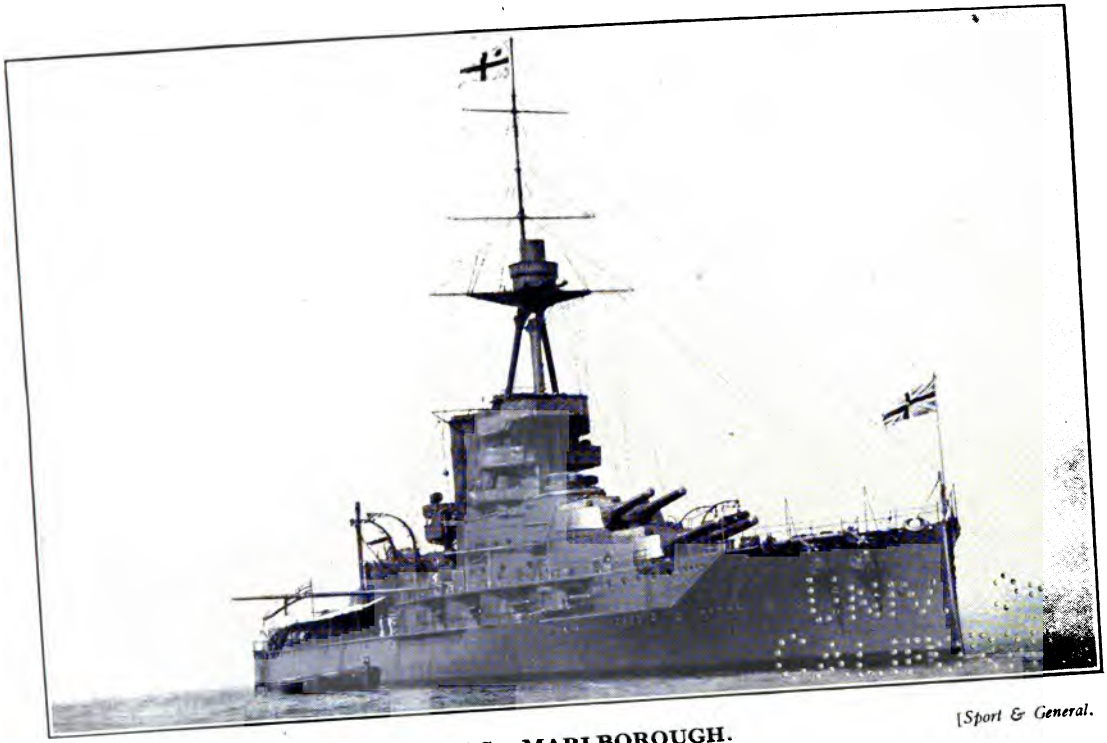
THE WOODEN WALLS—SEAMANSHIP OF SAILS—MODERN OFFICERS SO TRAINED—"IRON STEAMERS"—DRAKE'S DREADNOUGHT—NELSON'S VICTORY—THE FIRST IRONCLAD—THE PERIOD OF EXPERIMENT—HOMOGENEITY AND STANDARDIZATION—INFLEXIBLE, LAST RIGGED BATTLESHIP—PRIMARY AND SECONDARY ARMAMENT—THE COMING OF THE DREADNOUGHT—THE NEW EVOLUTION FROM THE NEW ALL-BIG-GUN TYPE — BATTLESHIP AND BATTLE CRUISER.

BEFORE we deal with the evolution of the modern Navy it is well that we should speak briefly of the Service as it was before modern mechanical invention placed it on the plane that it occupies to-day. Perhaps nothing will bring this home more vividly to younger readers of this chronicle than the fact that men with honoured names such as Lord Fisher of Kilverstone, Admiral of the Fleet Sir Arthur Wilson, Admiral of the Fleet Sir Gerard Noel,

Admiral Lord Charles Beresford, Admiral Sir Cyprian Bridge, and Admiral Sir Reginald Custance, besides many other veteran seamen held in high honour by the younger generation of the Navy, received their training as youngsters in the wooden walls of old England, ships which differed but very slightly from those by which they had been preceded in the brave days of old, the times of Nelson and St. Vincent.

And let it be here set down that to these men whom we have mentioned, and to their contemporaries in the Service, the country owes a debt of gratitude which it would be impossible to over-estimate. Trained in the old school of seamanship, when the ability of a man to manœuvre his ship under sail was regarded as the primary test of the ability of a naval officer, they lived to see the wooden three decker superseded by the monster steel battleship of to-day, witnessed the introduction of rifled ordnance, assisted at the birth of the Whitehead torpedo, and saw one by one the standards of their youth and early manhood disappear before the resistless sweep of modern mechanical appliances; so it came about that they strove during all their service careers with change such as all the aeons of time had never before witnessed. To sheer seamanship science had to be wedded; the craft of the old time sailorman still survived for a time, but new conditions had to be faced as they arose. They had in the first instance to learn all these new things for themselves; they had in the second to impart this knowledge to the rising generation.

iv. **H.M.S. MARLBOROUGH, 1860.**
[From a painting by Harold Wyllie.



[*Sport & General.*

H.M.S. MARLBOROUGH.

The generation which succeeded the veterans that have been named has its most prominent representative in Admiral Sir John Jellicoe, whose proud privilege it is now to command the most mighty fleet that ever sailed from the shores of Great Britain. Even when this distinguished officer joined the Service in 1871 the conditions of training differed but little from those under which his predecessors had been brought up. In the widest acceptation of the term there is no class of men so essentially conservative as the seaman. In 1841 the Admiralty set their faces like a flint against steam vessels, which they felt convinced were useless as fighting machines; and even when they made some slight concessions and introduced a few ships which utilized the new method of propulsion, they were savagely attacked by no less important a person than our old friend *Punch*, who condemned their idiotic folly in no measured terms. They were told that anything which came out of a "foundry" was predestined to "founder," and that this was all that was likely to happen to their newfangled "war steamers." *Punch* however was preaching to the already converted, and thirteen years later, when the Crimean War broke out, Britain's Fleet was, to all intents and purposes, still mainly composed of sailing ships.

This is not the place or the time to enter into any historical disquisition on the ships of a bygone day. Still, as the name of the modern Dreadnought is famous all the world over as the accepted designation of a type, we must permit ourselves to jot down a few

particulars of her predecessor in the time of Drake. In 1578 the Dreadnought was a ship of 400 tons, manned by 250 men—the modern seaman wonders where they all stowed themselves away—whereof, says the roll of the navy for that day, there were mariners 140, gunners 20, soldiers 80, the remainder officers. The "furniture of the ship" was, Harquebusses 80, Bows 25, Arrows, sheaves of 50, Pikes 50, Bills 60, Corselets 40, and Mariners (*sic*) 80.

From the time of Drake to the building of the first ironclad the ships of the Royal Navy, although they became bigger, differed little in type, the two-decked and three-decked line of battle ships being the generally accepted units for bearing the shock of battle.

It is well before we pass on to give some idea of the size and armament of one of these vessels, and for this purpose we select the most famous of them all, namely, Nelson's Victory. This ship was built from the design of Sir Thomas Slade, at Chatham Dock yard, and launched May 7, 1765.

Her length of keel was 151ft. 3in.
From figurehead to taffrail, 226ft. 6in.
Length of gundeck, 186ft.
Extreme breadth, 52ft.
Depth of hold, 21ft. 6in.
Tonnage, 2,162 tons.
In 1778 her armament was :—
On the lower deck, thirty long 32 pounders.
On the middle deck, thirty 24 pounders.
On the main deck, thirty-two 12 pounders.

On the upper deck, twelve short 12 pounders.

Total, 104 guns.

In 1793 four 32 pounder carronades were substituted on upper deck and six 18 pounder carronades were added on poop, making her total number of guns at this time 110. The last six were subsequently removed, and at Trafalgar she had no guns on the poop. In 1803 two 68 pounder carronades were placed on the forecastle, instead of two 32 pounders, when the weight of her broadside fired from 52 guns was 1,160lb. The word "carronade," as applied to cannon, is often puzzling; it was used to denote the short but powerful guns which were manufactured at the Carron Ironworks in Scotland, not far from Edinburgh. These works are still in existence. We have said that the weight of the broadside of the 52 guns of the Victory was 1,160lb. The weight of one shell from the modern 13·5in. gun is 1,400lb.

We pass now to the time when iron superseded wood in the construction of warships, to be succeeded in due time by steel. The first idea of the "armourclad" vessel was to cover the side of the ship with iron plates. To do this in a two-decked or three-decked ship was impossible, as the extra weight would have submerged her lower ports, or even if it did not do this, would have placed them in such close proximity to the water as to render the opening of them a most dangerous operation. It was therefore decided to build H.M.S. Warrior, the first of our iron-clads, as a frigate, that is to say, a vessel with one fighting deck.

But even in her case the pioneer builders of the ironclad were hampered by the enormous weight which the ship had to bear, subject to the condition that she must so float that the best use could be made of her as a fighting machine. It was evident that it was a case for a compromise, and the designers met it by leaving the ends unprotected and plating the middle portion for a little over half her length. This arrangement involved placing an armoured bulkhead across the ship at each end of the armoured portion of the side to protect her against a raking fire. She therefore became a floating square iron box as far as her midship section was concerned, with unarmoured ends that could easily be pierced. Experiments having shown that 4½in. of iron, backed by 18in. of teak, could not be penetrated by the 68 pounder gun, then the most powerful ordnance in use afloat, this specification was accordingly used in the construction of what was avowedly an experimental ship. She was built at the Thames Ironworks, Blackwall, from the designs of the Controller of the Navy, Rear-Admiral Robert Spencer Robinson, and launched December 29, 1860 ; she was engined by John Penn, of Greenwich. The ship was 380ft. 2in. in length ; her beam was 58ft. 4in. ; extreme draught of water, 26ft. 9in. ; her tonnage was 9,210 ; and her engines developed 5,270 h.p. Her nominal speed under steam was 14·4 knots ; her radius of action at 10-knot speed was 1,210 miles. Her armament was four 9 ton muzzle-loading rifled guns, and twenty-eight 6½ ton guns ; she also carried four light guns and eight

machine guns. She was heavily rigged as a ship, that is to say, she carried square yards on all her three masts, and her complement of men and officers was 709.

If any apology is needed for dwelling at length and in detail on H.M.S. Warrior, the answer must be that with her we embarked on that period of construction which, when the present war began, had its latest manifestation afloat in H.M.S. Iron Duke, the flagship of Sir John Jellicoe. We have said that the Warrior was fully rigged, and many years were yet to elapse from the date of her construction until the last of the masts and yards were jettisoned, and the old time sailor had to stand aside finally and recognize that time and the maritime engineer had no further use for him in a modern scheme of sea existence. As the years passed and the sailing vessel became ever and ever more of what modern slang denominates "a back number," still did the mariner reiterate the question, "How are you going to train your men?" Even as late as 1903 boys destined for the service were still at work learning the seamanship of their fathers and their grandfathers until the time came when the sails were unbent, the yards sent down, and all the paraphernalia of the past faded away, even as the harquebuss, and the sheaves of Arrows, the Bows and the Bills of the Dreadnought of 1578 have also faded.

In speaking of the evolution of the modern Navy we have to recognize that the four decades 1860-1900 were essentially periods of experiment: that new types

of ships were continually being evolved, to serve a comparatively short time, to be discarded and superseded by something newer, this latter also immediately finding a successor, until our fleets, when collected together for grand manœuvres, presented the most amazing variety of types, so far as large armoured ships were concerned. During this time a large amount of money was always expended on smaller ships—frigates, corvettes, and gunboats in the earlier period, cruisers, torpedo boats, and destroyers in more recent years. In the sixties, the seventies, the eighties, and the nineties (to a smaller extent) our fleet abroad was much larger, comparatively, than it is to-day. When we see all the nations who have been sitting at the feet of Admiral Mahan and reading his well-known "Sea Power" books, and who having read have believed, and having believed have acted, we have the clue which explains why in recent years our legions of the sea have been drawn with an ever greater attraction around our coasts.

Before the year 1890, although the larger units of the fleet were built in batches of two, three, and four ships of the same tonnage and armament, there was no coordinated effort to attain homogeneity and standardization in our battle fleet. In 1892 we arrive at what may be termed the modern period, as in that year the Royal Sovereign class of eight ships was begun and these ships formed the precursors of a whole line of similar vessels, also built in batches, which in their main features closely resembled one another. Without entering

into tedious details it is sufficient to say that the Royal Sovereigns were ships of 14,150 tons, and that their main armament was four 13.5in. guns, disposed in pairs, one at each end of the ship in barbettes, with a secondary armament of ten 6in. quick-firing guns on the broadside. They carried in addition sixteen 6 pounders, twelve 3 pounders, and eight machine guns. They were a great advance not only in power but in speed on all the big ships by which they had been preceded, and possessed the advantage, so important in a battle squadron, of complete homogeneity. Ships which have the same speed and the same turning circle can act together in battle in a manner impossible to the same number of vessels of diverse types.

This system evolved in 1892 was continued, due regard being paid to the progress of ordnance, armour, and torpedoes. What is noticeable in the period under review, however, is that in spite of retrogression here and there in the tonnage of our battleships the trend had generally been upwards. Thus the Inflexible 1881, the monster ship of her day, was 11,880 tons. Incidentally it may be remarked that she was rigged as a brig, that is to say with two masts and square yards of immense size, which when sail was made upon them in a strong breeze rendered her completely unmanageable, as deponent can witness. In 1890 came the Nile and Trafalgar of 11,940 tons, and then, as we have said, the Royal Sovereigns. To enumerate all the different classes by which the Royal Sovereigns were succeeded would be to weary

the reader, for although the ships differed in tonnage, and in some other respects, they all had the same scheme of armament—that is to say, four big guns disposed in pairs in turrets or barbettes at bow and stern, and a secondary armament of smaller guns on the broadside. It has been the vice of the naval constructor from the earliest ages to multiply the types of weapons in one individual ship; we shall find it in the "Great Harry," with her cannon royal, demi-cannon, falconets, sakers, serpentines, and so on, and can follow it down until our own day. This policy leads, of course, to the infinite subdivision of the ship below into small receptacles for the stowage of the different classes of ammunition for the guns; and, further, to the infinite subdivision of the crew in action into ammunition parties to supply the different quarters. In the Royal Sovereigns, the Majestics, the Canopuses, the Formidables and the Duncans the problem had been reduced to a relative simplicity by the employment of only two types of guns for primary and secondary armament. The question then arose as to the utility of retaining the last named. The straw which showed the way in which the wind was blowing came in the shape of an article from the pen of the late distinguished Italian naval architect, General Cuniberti, which was published in the 1903 edition of that most useful book of reference "Jane's Fighting Ships." Here was foreshadowed what the author called "an ideal British Battleship," which embodied the "all big gun" idea and came into being three years later. It

was held at the time by some distinguished critics that the building of this vessel, the Dreadnought, was a mistake, one reason advanced being that from the moment she took the water all other battleships whatsoever became *déclassés*, with the result that we in Britain thereby lost our supremacy and only started level in the race with all our foreign competitors. There was, of course, something in this contention; at the same time we have to remember that no one can put a period to the improvement of ships, or to the apparently inexhaustible inventiveness of the modern constructor; also that had the Dreadnought not been evolved in 1906 her coming would only have been delayed a short time, and our country would have lost the start that at that date she unquestionably gained.

What the naval world has witnessed since then has been the development of the original idea. The all-big-gun ship having arrived, and it being recognized that she had arrived to stay, the process of evolution began afresh. A treatise might be written on the evolution of the modern warship in all her manifestations of battleship, armoured, protected, and light cruisers, torpedo boats, destroyers, submarines, and auxiliary vessels of the fleet, differentiating among the different classes and producing the arguments for and against each separate class; but for such a conflict of arguments there is here no space, and we must confine ourselves to the development of the premier type, the one which counts first, to wit, the capital ship. The original Dreadnought was 17,900 tons and was

armed with ten 12in. guns, the disposition of her armament being three turrets, each with two 12in. on the central line of the keel, and two others, one on the starboard and the other on the port beam, disposed between the funnels; thus giving her a broadside of eight guns on either beam. In 1907 came the Bellerophon class of three ships, in which the armament and the disposition thereof were practically the same, but tonnage had crept up to 18,600, and sixteen 4in. guns had taken the place of the twenty-four 12 pounders of the Dreadnought as an anti-torpedo armament.

The St. Vincents—three ships—resembled the Bellerophon, but tonnage had again risen, this time to 19,250, and two more 4in. guns were mounted. The Neptune, 19,900 tons, is a single ship; in her as well as in the St. Vincents the 50 calibre 12in. gun is mounted as opposed to the 45 calibre weapon mounted in the earlier ships. A gun 50ft. long takes up a great deal of room. Accordingly in the Neptune we find for the first time the superimposed turret. This ship carries one turret forward, two in échelon on the beam, while aft one turret fires, if necessary, over another. She carries sixteen 4in. guns. The Colossus and Hercules, of 20,000 tons, dating 1910, have a similar disposition of armament. This arrangement marks a highly important development, for whereas the older ships—the Dreadnought, the Bellerophons, and the St. Vincents—could fire only eight of their heavy guns on the broadside, these three vessels, for the first time in the history of the battleship,

can use all the heavy guns they carry at one and the same time on either broadside.

In the next batch of four ships, the Orions, completed in 1912, the same result is achieved in a different way, by an extension of the principle of superimposition. The five turrets are all placed in the centre line of the ship—one amidships and two at either end—and those at the bow and stern are superimposed so that in each case the guns of one can fire over those of the other. The ships are 22,500 tons and are armed with ten 13.5in. guns of 45 calibre, which discharge a shell weighing 1,250lb. Thus the place of the 12in. gun, with its projectile weighing 850lb., has been taken by the 13.5in., with a projectile weighing 1,250lb.; each gun, therefore, discharges 400lb. more in weight, or a total of 4,000lb. to the broadside.

Next after the Orions come the King George V. class. These four ships are of 23,000 tons, and are armed similarly to the Orions; there is, however, an important difference in that their 13.5in. guns throw a shell of 1,400lb., instead of 1,250lb. The next class are the Iron Dukes, four ships, which are improved King George V.'s, carrying twelve 6in. guns instead of sixteen 4in. The latest development, for the present, is represented by the 27,500-ton Queen Elizabeths; they are to be armed with eight 15in. guns and twelve or sixteen 6in.

There are, however, other ships of the line to be taken into account and these are what are known as "battle-cruisers." Briefly, the difference between the battleship and the battle-cruiser is that in the battleship speed is,

to a certain extent, sacrificed to power: in the cruiser power is—also to a certain extent—sacrificed to speed. The inclusion of the battle-cruiser among those units of the fleet which are fit to lie in the line of battle has caused a considerable amount of controversy. To sacrifice power in ships so costly has seemed to one school a heresy of the worst description, while the advocates of speed have pointed out the immense advantage of having a squadron of capital ships that can arrive on the scene of action in the least possible time. The first of this class, and almost contemporary with the Dreadnought, are the three Invincibles of 17,250 tons. These ships carry eight 12in. guns — two forward, two aft, and two on either beam — in such wise that all eight guns can be fired as a broadside on either beam. Where they differ from the battle-ship is in their greater length, 560ft. as opposed to 520ft., in their lesser beam, 78½ft. as opposed to 82ft. and in a designed speed of 25 knots, as opposed to 21.5. The Indefatigable (1909) and the New Zealand (1911, presented to the British Navy by New Zealand) are 18,750 tons, carry the same armament, and have more powerful engines. The Australia, of the Australian Navy, belongs to the same class.

Later battle-cruisers, the Lion and Princess Royal, are 26,350 tons, carry eight 13.5in. (1,400lb. shell) guns, and have a designed speed of 28 knots, though this has been largely exceeded. The Queen Mary, now in commission, displaces 27,000 tons, and the Tiger, now

nearing completion, is understood to be of an even larger displacement.

We have thus passed rapidly in review the capital ships of the past and the present, although the sketch is necessarily imperfect and might be elaborated to a far greater extent. Since the days of the battle of Sluys in 1340, on through the Armada time in 1588, in the Dutch wars of the Commonwealth, in the protracted struggle with the French which ended only a hundred years ago, Great Britain has dwelt secure because she has held the seas. The armed peace in which we have dwelt for so many years past is broken at last and the battleships of Britain have gone forth to meet the foe. We have spoken in this chapter mostly of things material, of ships and of guns, but that which far transcends the weapon is the man. Sir Francis Hastings Doyle has said :—

> "Vain mightiest fleets of armour framed
> Vain those all-shattering guns ;
> Unless proud England keep untamed
> The strong hearts of her sons."

We, who cannot be with them, know that out in the grey North Sea the same spirit abides that has ever animated the seamen of Britain.

CHAPTER III.

CRUISERS, AND THE EVOLUTION OF THE TORPEDO.

TRANSITION PERIOD—STEAM FRIGATE—CORVETTE—CRUISER—FIRST ARMOURED CRUISER—FIRST OF LARGE ARMOURED CRUISERS—NECESSITY OF SECURING MARITIME COMMUNICATIONS—THE CEREAL YEAR—RUSSIA AND INVASION—MENACE OF THE TORPEDO—ENORMOUS COST DUE TO THIS INVENTION—INSECURITY OF GIBRALTAR BAY—HOW THIS WAS MET—AN EARLIER TORPEDO, THE HARVEY—EVOLUTION OF THE TORPEDO BOAT.

IN the days of the sailing line of battleship the Admiral in command was dependent for his information on his frigates and such other small craft, then known as corvettes, sloops, brigs, &c., as were attached to his command. During what may be called the transition period, that is to say, while masts and sails still formed part of the equipment of our steam Navy we were still building frigates. Under the command of the late Admiral Sir Geoffrey Hornby a squadron of these steam frigates made a voyage round the world in the early seventies of the last century. They were magnifi-

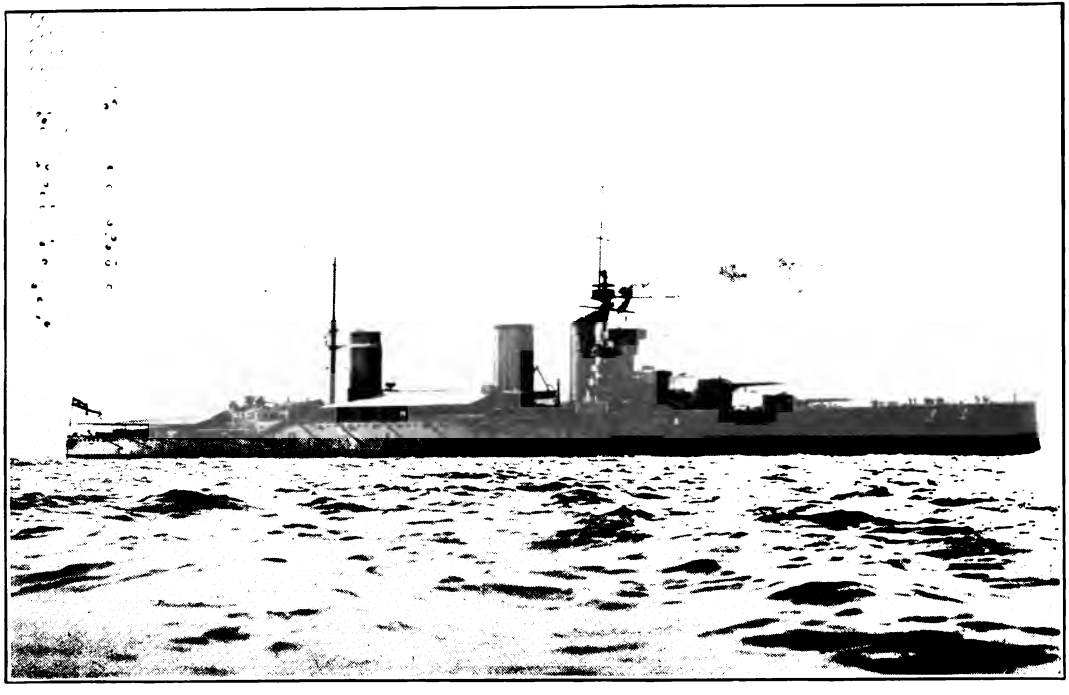
cent sailing ships although their steaming qualities left a good deal to be desired, and the training that was imparted in them turned out as smart and capable a race of seamen as the world has ever seen. To give some idea of what these ships were like we may select one example, H.M.S. Narcissus. She was built at Devonport Dockyard from designs by the Deputy Controller of the Navy, Captain Sir Baldwin Walker. She is described as a screw frigate of 28 guns and 400 horse power. Her length was 228ft., beam 51ft. 3in., depth of hold 18ft. 2½in., draught of water aft 22ft. 10in., tonnage 2,265. Her speed under steam was 10½ knots, but this speed was frequently exceeded under sail. She was launched in 1859 and continued her active career afloat for some twenty years. The frigate was a vessel which carried her guns on the maindeck, having only one tier of ordnance. She ranked in her day immediately below the two-decked ship, but was not intended to fight with such an opponent. She acted as the eyes of the fleet, and being swift and handy she harassed the merchantmen of the enemy.

In pursuance of our survey of the ships in use during the transition period, the next vessel to be considered is the corvette. She was of medium size and light draught, and carried all her guns on the upper deck. As an example taken at random from among the large number of these craft we may mention the Royalist, which was built at Devonport in 1883 and engined by Maudslay. She was 200ft. long, 38ft. beam, drew 15ft. 9in., tonnage 1,410, speed 13 knots,

armament two 6in. and ten 5in. breech-loading guns. Following the corvette were the sloops, gunvessels, and gunboats, which were employed on foreign stations, their small size and light draught making them singularly useful on shallow coasts and up rivers.

There are certain dates in modern naval history that mark a definite epoch; one such was the building of H.M.S. Warrior, of which mention has already been made; another date was 1864, the year in which Commandant Luppis, of the Austrian Navy, sold to Mr. Whitehead, the director of the technical establishment at Fiume, the patent of the invention to which we owe the Whitehead torpedo. Again, the substitution of breech-loading for muzzle-loading ordnance was an immense step forward, but to this no date can be assigned, as the process was a gradual one, we, with our usual conservatism, clinging to the muzzle-loader much longer than our rivals. In 1884 came a great awakening of public opinion in this country by means of a vigorous Press campaign which was initiated by the *Pall Mall Gazette*, and entitled "The Truth about the Navy." Modern men with up-to-date ideas made themselves heard and a vigorous effort followed to put our naval house in order. In 1886 there were on the list of the unarmoured vessels of the Navy only 15 which bore the designation "cruiser," a title which has since superseded the terms frigate and corvette altogether.

So much for past history. Let us now see what the term cruiser has come to mean in the present day.



vi. **H.M.S. PRINCESS ROYAL.** [*Sport & General.*

We have seen in the chapter on "The Evolution of the Battleship" that the battle-cruiser is as large as, and in some cases larger than, her sister the battleship, and that she is competent to lie in the line of battle. To put it shortly, the term cruiser, as applied to these extra fast battle vessels, is not very appropriate. Therefore, in speaking of the cruiser we can rule out this class altogether. The first real armoured cruiser built for the Navy was H.M.S. Shannon, dating from 1875, She was 260ft. long., 54ft. beam, draught 23ft. 3in. tonnage 5,390. She was armed with two 18-ton and seven 12-ton muzzle-loading rifled guns; also 18 machine and light guns. Her belt armour was 8¾in. in thickness, her speed was 12¼ knots. A detail concerning this vessel is not uninteresting. At the time she was built the minds of men were still obsessed with the feat of Admiral Tegetthoff, who at the battle of Lissa had rammed and sunk the Italian flagship, the Re d'Italia; the ram in consequence was regarded with favour as a weapon of offence. The Shannon was provided with a ram, but it was a detachable one In the piping times of peace the Shannon left her ram in store at Devonport Dockyard. When the alarm of war was sounded she was supposed to return to Devonport, screw on her ram, and thus further armed put to sea to seek the foe. She was the only ship to which this original idea was applied. In 1883 came the Impérieuse, of 8,400 tons and 16¾ knots speed, in 1886 the Australia, of 5,600 tons and 18¾ knots. In 1899 the ill-fated Cressy, of 12,000 tons, was the first of the large and very fast

cruisers. She had a speed of 22¼ knots and a powerful armament of two 9.2in. guns (throwing a 380lb. projectile) and twelve 6in. quick-firers (100lb. projectile). In 1901 came the Drake, of 14,100 tons, with four more 6in. guns than her predecessor and a greatly increased speed of 25¼ knots. In 1902 came the Lancaster, of 9,800 tons, with a speed ¾ of a knot less than her predecessor and an armament of fourteen 6in. guns. In the Black Prince of 1904 tonnage rose again to 13,550, and in 1906 the Minotaur showed a further increase to 14,600 tons. This vessel was the immediate forerunner of the Invincible, built in 1909, of 17,250 tons, with a speed of 25 knots, armed with eight 12in. guns, the first of the battle-cruiser class.

Like the battleships the armoured cruisers have been built in batches, and with their high-speed and formidable armament they are most efficient vessels. That they differ greatly in main features of tonnage, armament, and speed is due to the fact that the science of naval architecture is continually changing, as are also the sciences of gun construction, of the manufacture of explosives, and of all those things that go to make up the equipment of a man-of-war. It will be shown in another chapter how cruisers are organized and distributed at the present time, or, to speak more correctly, how they were organized on the outbreak of war. This will demonstrate to the reader the manner in which defence against the German peril had been provided against in times of peace.

As already pointed out, the Fleet of Britain

has in time of war two duties to perform. The first, to which every other consideration must give way, is the defeat and destruction of the main fleets of the enemy. The second, which although collateral is still of immense importance—and is best attained by the achievement of the first—is the control of maritime communications. On land, if the main line of the enemy's communications can be cut he is left, so to speak, in the air ; because, even supposing that he can procure food for his forces in the country invaded, he is cut off entirely from his supply of ammunition, without which he cannot fight. In the case of an island State, such as our own, which depends for its daily bread on oversea supply, if you cut off communication it inevitably starves. When men who have studied war cried aloud to an indifferent nation for more battleships and more cruisers they had this fact always in their minds.

Let us then support the contention of the vital necessity of our maritime communications being secured at any cost by an appeal to some significant figures, which are the latest available. On August 31 last year there closed what is known as "the cereal year." During the 12 months from the preceding August there were imported into the United Kingdom from Russia alone over 13 million quarters of wheat, over 17 million quarters of barley, nearly 5½ million quarters of oats, and nearly two million quarters of maize. This list might, of course, be extended indefinitely by including the statistics of shipments of cereals from Canada,

Australia, and the United States of America, to say nothing of the large additional supplies of these products which come from the Argentine Republic, from Brazil, from India, and elsewhere. And when all this has been enumerated there remain still the ships that bring the frozen meat from the antipodes and South America, those that bring dairy produce from Denmark, those that load up with fruit in the West Indies or the Canaries, with rice in China, with dates and salt in the Persian Gulf, or with other tropical food products that are harvested in that immense chain of islands that extends southwards from Singapore to Australia. Be it noted that here we do not speak of ships engaged in the commerce of other articles, but merely of those which, in the words of Kipling,

"Bear the wheat and cattle lest street-bred people die."

The problem for the continued existence of Great Britain is thus, first, last, and all the time, the question of the sea, and this was fully recognized by the greatest warrior who ever drew the sword for the enslavement of mankind. On June 9, 1805, Napoleon wrote to Decrès from Milan: "Il ne faut être maître de la mer que six heures pour que l'Angleterre cesse d'exister." What was true then is no less true to-day, when once again the Fleet of Britain stands between her own shores and the forces of an adversary who avowedly seeks to destroy her.

If the writer may be pardoned a personal reminiscence,

germane to this subject under discussion he would venture to recall what was said to him many years ago by a Russian naval officer. The ship which the writer then commanded was lying in Aden. A Russian man-of-war arrived there during his stay, and after the usual formal calls had been exchanged the Russian captain accepted an invitation to luncheon on shore. The kaleidoscope has shifted now, and we are proud to think that Russians and Britons are fighting together in defence of their common liberties and those of all the world. Then, however, the British Lion and the Russian Bear were decidedly at cross purposes and after luncheon with perfect amity the two officers discussed invasion. There is no occasion to record the conversation save and except the manner in which the Russian summed up the situation. At the Nobles Club in St. Petersburg—or Petrograd as we must now very willingly learn to call it—a war game had been in progress with the invasion of England as its basis. The Russian captain in question had been invited, as a naval officer, to work out the amount of transport required in terms of ships to convey one army corps from his own country to ours. This he had done, and was somewhat surprised himself at the amount of tonnage required; and all this information he detailed for the benefit of his hearer. Finally he took his cigar from his mouth and leaned forward, his elbows on his knees, "Ma foi," he concluded, "but you English are a strange race. Invasion! Bah!" There was an indescribable accent of contempt in his voice and he

puffed fiercely at his cigar before he resumed. "Napoleon, it was no less a genius than he who strove all his life to invade England; and now these little men, these little men," he swept a contemptuous hand some six inches from the floor to indicate their stature, "they make their schemes, and they will vanish, like that." His strong right hand pointed at the cigar smoke which was drifting out over the rail of the verandah into the glare of the burning Aden sunshine.

The menace of the torpedo to the transport remains, being in fact greatly enhanced by the increased power, range, and precision of the weapon since the date of the conversation recorded above. At its inception the automobile torpedo was looked upon as a defensive weapon; and further it was hoped that in this contrivance an answer had been found to the capital ship, which by its use could easily be put out of action. In the eighties and nineties of the last century the "Jeune École" of the French Navy, headed by Gabriel Charmes, induced the Powers that presided over the fortunes of their service to invest heavily in torpedo boats. It was not till some time after these had been completed and put into commission that it was discovered that the French Admiralty and the Jeune École had both put their money on the wrong horse. Practical experience proved that a torpedo boat was but little of a menace to her larger sister of the sea, because in the first place the weapon that she carried was, in its earlier manifestations, extremely inaccurate and unreliable, and,

further, because the frail vessel in which it was carried could not keep the sea at all in anything approaching bad weather.

But even in its earlier stages the torpedo had an enormous moral effect. Everyone has a decided objection to being blown up. Men on board a warship have the feeling that if it comes to shooting it will be the other fellows who will be hit; but when it comes to the bottom of the ship being blown out and all hands proceeding to Davy Jones's locker in company, they like the prospect appreciably less. Since the world began there has never been anything that has cost as much in a given time as has this ingenious invention of the late Mr. Whitehead. In the case of our own country, not only is the torpedo fitted in under-water tubes in all our big ships, but it has a fleet of its own, made up of destroyers, torpedo boats, and submarines, which alone in prime cost and upkeep disposes of a large number of millions sterling per annum. Nor is this all. Those short-lived monsters, the battleships, which to-day are and to-morrow are scrapped on the Mother-bank or in the Kyles of Bute, must at all hazards be protected from these pestilent things. It is no use spending two millions on a super-Dreadnought to have her severely damaged by a torpedo costing only a few hundreds of pounds, so wherever she may be lying, she must be safeguarded from underwater attack.

Very early in the life of the Whitehead the question of open anchorages accessible to torpedo

craft was brought into prominence and urgency. Of these, we may take Gibraltar as an example, but similar considerations apply to other anchorages, such as Portland and Dover at home, Malta, Colombo, and Simon's Bay abroad. The first outpost of the Empire, the key to the Mediterranean was menaced by the Whitehead torpedo. This is not to say that the Rock itself was in danger of being blown from its foundations. But ever since Rooke had absentmindedly annexed it for England in 1704 it had been a secure refuge for the ships of Britain, warships and merchant ships alike, and now that the Whitehead had arrived with its potentialities for destruction that time was past. Toulon was but 700 miles distant, Oran in Algeria only a little more than 200 miles, and in both stations torpedo boats might be assembled by the score and the hundred. A few hours' run to the Rock in fine weather, and then they might be in among the battle fleet; what matter if one-half of them were sunk, the damage they might do was incalculable. All the same the home Government demurred at the expense, and for this they had good cause. But at last it was recognized that there were but two alternatives: the one to abandon the Rock as a naval station, thereby losing it as the key to the Mediterranean, the other to construct a harbour in which the warships could lie in safety. In the end the proposed works were approved, taken in hand, and finished. To-day the battle squadron, immune from any fear of torpedo attack, can

lie beneath the shade of Mons Calpe; and now, when the time for peace is at an end, and the war drums beat from the lines on the Neutral Ground to where the Union Jack flutters, south, on Europa Point, the value of those millions that were spent at the Rock becomes decidedly apparent.

We are not for the moment concerned with the Whitehead torpedo itself, which will be dealt with later. We have here to consider the craft in which it is carried. Before the year 1873, and for some years subsequently, the ships of the Navy, which were then provided with masts and yards, were in the habit of carrying the Harvey torpedo, a curiously shaped box containing explosives, which was towed from the foreyardarm of the ship by which it was being used. The idea was as follows: the torpedo was towed by a single whip, in other words by a rope rove through a block at the yardarm. The inboard end went round a drum and was attended by a man of intelligence told off for the purpose. If he slacked off the rope the torpedo sank lower in the water, if he held on it rose to the surface. What you had to do, therefore, was to run alongside the foe; as you reached him the seaman attending to the rope held on; the torpedo rose under the enemy's bottom, and, as it struck, an arrangement of levers on the top of the box pressed down the key by which it was exploded. It did not seem to have occurred to the inventor that when ships came so close to one another as to be almost touching the torpedo

might misbehave itself and blow up the vessel by which it was towed, to say nothing of the probability that the guns of one ship or the other would have decided the issue beforehand. The year 1873 has been mentioned because it was at that date that the first real torpedo boat was built by Thornycroft, of Chiswick, for the Norwegian Government. She was in effect really little more than a boat, being 57ft. long and 7ft. 6in. beam, and was of 7½ tons displacement. It was with this modest craft that the torpedo flotillas of the world were begun; but in spite of her very moderate dimensions she was, for her date, extremely fast, her speed being only a fraction under 15 knots. Four years later, that is to say in 1877, the first torpedo boat was built for H.M. Navy. This was H.M.S. Lightning, of 27 tons, 460 horse power; she was 85ft. long, 11ft. beam, and had a draught of water of 5ft.; her maximum speed was 18 knots.

Between 1878 and 1885 the British Admiralty, with traditional conservatism, refused to trouble themselves overmuch about torpedo boats; the Navy was merely stirring in its sleep, and was by no means yet fully awake to the potentiality of the new arm. Other navies were not so backward as our own in experimenting with the torpedo and the craft in which it was destined to be carried. In 1884 Russia had 115 boats, France 50, Holland 22, Italy 18, Austria 17, and Britain 19. This seems an incredible state of affairs, but it is nevertheless true. After 1885 the torpedo craft became one of the offensive weapons of the British Navy, and it is curious to reflect upon the fact that the idea which

germinated in the wonderful brain of a Lancashire engineer should have cost the world more money than any warlike invention, save the gun, that has ever been used for the destruction of mankind; and that this weapon, which is not only supplementary to the gun, has had in the past forty years an enormous fleet built for its accommodation as a primary means of offence. The craft in which torpedoes are and have been carried very soon began to show that upward tendency in tonnage which has been so marked in the navies, both war and mercantile, of the past four decades. Manœuvres at sea, both of our own and foreign fleets, soon demonstrated that torpedo boats of less than 100ft. in length were totally useless as sea-keeping vessels. If you desire speed at sea you must have a long ship, and this is plainly demonstrated in the present day by the immense length which characterizes the abnormally fast vessels both of war and of the mercantile marine. In 1887 the Board of Admiralty reported that they did not consider the sea service was strong enough in torpedo boats, and an order was given for six first-class and ten second-class boats. The first-class boats were 130ft. long, 13ft. 6in. beam, with a draught of water of 5ft. 6in. With a horse power of 1,110 their maximum speed on trial was 23 knots.

Although two first-class torpedo boats succeeded in crossing the North Atlantic in the year 1890, the experience was one that none on board them wished to repeat, as they had dreadful weather and life in them was a purgatory. Great as were the sufferings of the

crews on this occasion it demonstrated that, skilfully handled, these small craft could keep afloat even in a full Atlantic gale; but it also showed that this was all that they could do, and that they would have been at the mercy of any moderate-sized enemy ship had the voyage taken place in time of war. But by this time the first step had been taken, the type had been evolved. The future was to show in what direction the further evolution would proceed.

CHAPTER IV.

TORPEDO BOAT DESTROYERS, SUBMARINES, AND FLEET AUXILIARIES.

TORPEDO BOATS, 1886 TO 1914—THE PATROL FLOTILLAS—THEIR DISCIPLINE—HARDSHIP—CRUISING IN PURSUIT OF SLAVERS—TORPEDO GUNBOATS—THE COMING OF THE DESTROYER—EVOLUTION OF THE TYPE—CRUISE OF THE PELORUS—SMALL BEGINNINGS OF THE SUBMARINE—IDEA OF TORPEDO BATTLESHIP—AIRCRAFT—THE AUXILIARY SCOUTS—MINE LAYERS AND MINE SWEEPERS—THE SURVEYING SERVICE.

BEFORE we leave the subject of the torpedo boat it is well to state that the type still survives, and that over a hundred vessels bearing this designation are on the list of the Navy to-day. This list includes a survivor of the original Yarrow boats of 60 tons dating from 1886 and ends with the new coastal torpedo boats of 260 tons, which, oil fired and turbine driven, can jump off from the post half an hour after the order to raise steam is given, and can, in any reasonable weather, continue at 27 knots until all their fuel is expended. It has been the privilege of the writer on two recent

occasions to go to sea in one of these admirable little vessels. To himself as one of that older school, trained in the old-time methods, yet one who has witnessed in his own time the mighty changes that have come about, these trips were principally interesting for the insight that they gave to him into the spirit that prevails in the modern young bluejacket, and also in those equally youthful lieutenants by whom these boats are commanded. The question that leapt to the mind of the old officer at once and before all things was, what of the discipline? In a craft like a coastal torpedo boat the officers—that is tosay, the lieutenant in command, the gunner, and the engineer officer—are never out of sight, touch, and hearing of the men whom they command; those who know what naval discipline is will acknowledge that to neither the officer nor the man can a higher test be applied. Necessarily the formal and ceremonious side of discipline, so evident in the big ships, is here conspicuous only by its absence; in a torpedo boat in half a gale in the North Sea that salute to the quarter-deck which every officer and man gives on arriving at that sacred spot in the larger units of the Fleet cannot be accomplished as officer or man struggles on deck holding on with hands and feet, while a liberal portion of the surrounding ocean pours over his head and down his throat.

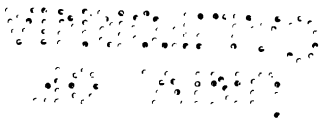
Among landfolk a question that is often asked is, "What on earth do men do all day long on board a warship?" A trip in a torpedo boat would disabuse the mind of any impartial person of the idea that the

officers and men there eat the bread of idleness. The loving attention devoted to the care of the torpedoes alone suffices to dispose of any spare time that may happen to be available at the moment. All that delicate machinery has to be cleaned and oiled and cosseted, so that when the weapon at length leaps from the tube it may fare forth to its distant goal with that precision and accuracy which is the wonder of the sea to-day. Even its very complexion has to be cared for like that of a young lady in her first season; and brawny bluejackets spend many half hours anointing the exterior of their charge with fine vaseline. Also let it not be forgotten that high speed is the note of the torpedo service; that weather is no bar to its activities; that to be washed down fore and aft as the boats crash into a head sea, or to ship it green first on one side and then on the other is the regular routine of these small craft when they run in front of the wind in bad weather.

These, the patrol flotillas, are indeed and in truth the "Wards of the Outer March." Questing, doubling, turning, strung out like a flight of seabirds, obedient to the call of their leaders, they ring and guard our coasts. For them, and for their sisters of the destroyer and submarine flotillas, the glorious motto of another splendid service, that of the Royal Artillery, might well apply: "Quo fas et gloria ducunt." Now, when the time of battle has come, these are the men and these are the ships that are in the very forefront; the manner in which they are acquitting themselves of the task has already been writ large on the scroll of

fame. The way in which war is regarded in the Fleet was neatly summed up in a letter from an officer in the North Sea that the writer was privileged to see :— "We are greatly enjoying the rest of war after the strenuous times of peace."

How strenuous the times of peace may be was exemplified in a cruise made by the patrol flotilla from Harwich one December. As soon as they got clear of the land it began to blow, and the same night it hardened down into a north-westerly gale of the bitterest description. Although the water froze as it broke aboard things were not too bad till they were off the Wash. "Then," said the officer who told the story—he was one of the lieutenants in command—"we all thought that we were done. There was such a frightful sea on that I had to lash myself to the bridge rails and pray that they wouldn't be washed away. It was on the beam, and we fell off the crest of one sea into the trough of the next sideways, like a bench falling off a wall. We couldn't put her head on to it or we might have gone ashore, and we couldn't see anything for the spindrift that was flaying us alive. No one could move about the decks and we knew if there was the slightest failure in the engine room that we were bound to go to the bottom at once, as the sea would have rolled her clean over. On the bridge we were wet to the skin inside our oilskins, while outside our coats and overalls were frozen into sheets of ice. One lost all sensation, the only thing that remained was the consciousness that it couldn't be worse and that we were bound to stick it out." At the



vii. **H.M.S. SHANNON.** [*L. N. A.*

end of twenty-four hours of this purgatory the flotilla intact, put into Grimsby, where they had to beat the ice away from the anchor before it could be let go. At last the welcome rattle of the chain through the hawsehole was heard. "And what then?" the narrator of this true story was asked. "I heard a voice behind me that said, 'I think you could do with this rather conveniently.' I turned round and saw my engineer officer, and in his hand he had a boiling hot glass of whisky and water; good man wasn't he? Then someone unlashed me and I went below to thaw out; and I ain't at all sure that that wasn't the most painful process of the lot."

That the Navy exists for war is an axiom; but the Navy exists for a great deal besides this, and the scope of its activities in time of peace is surprising to those not intimately acquainted with the sea service. If we look back to the seventies, eighties, and nineties of the last century we shall find that England, having decreed the suppression of the slave trade, had delegated executive action in this respect to her Navy; and, in corvette, gunvessel, gunboat and sloop, the immediate predecessors of the men now serving spent laborious and singularly unhealthy months and years in watching West African rivers, East African and Madagascar ports, reef-choked stretches of the Red Sea, and "harbours" in the Persian Gulf, where a clump of sun-scorched palms and a few miserable huts stood between the pale blue fire of the sea and the red hot sand of an endless desert.

On dusty files in Admiralty pigeon-holes are to be

found records of many gallant actions fought in those far-distant waters : actions of which the British public as a whole never heard, the records of which never found their way into the public Press, but which nevertheless proved that the same stern spirit of heroism and efficiency which answered to the call of Nelson and Cornwallis was ready when wanted in the ships of Britain scattered over the face of the globe in the last decades of the 19th century. For the most part the lot of those called upon for the suppression of the slave traffic was one of unending monotony, of burning sun and drenching rain, of a diet of salt pork and ship's biscuit in an open boat in the tropics, of fever and boils. What sustained these men were the traditions that lived on the coasts of slavers who had put up a fine fight, who had given to the waiting and watching men-of-war's-men at least "one crowded hour of glorious life," when British cutlass clashed with Moslem scimitar and the blue waters of the South Atlantic or the Indian Ocean ran red with theblood that was shed for that liberty which Britain put forth in her decree that the slave should have his freedom, that this accursed trade should no longer befoul the earth.

In the profession of arms, whether it be by land or by sea, no sooner has some new device been adopted than men set to work to try and find something with which to counter the latest manifestation of ingenuity. The torpedo having come to stay, it became necessary to find an answer to the activities that it was likely to develop. Before the arrival of the vessel known as the

torpedo-boat-destroyer—shortly the destroyer—another type filled for a time the position that she was destined to occupy. The vessels of which this type was composed were known as torpedo-gunboats or " catchers." They were vessels of some 700 tons, fast for their time, handy, and most excellent sea boats, but they were very quickly superseded by the destroyer and were relegated to positions of subsidiary utility, such as fishery protection, a humble but none the less a most useful duty. We have to go back 21 years for the pioneer vessel of the destroyer type. In 1893 H.M.S. Havock was built. This vessel was a great stride in advance of any of those torpedo craft by which she had been preceded. Although she was but 240 tons, against the 810 tons of the Leda torpedo gunboat, her actual speed was a fraction over 26¾ knots or five knots faster than a vessel considerably more than three times her size. She was 180ft. in length, 18½ft. beam, her draught of water was 5¼ft., her armament, apart from torpedoes, was one 12 and three 6 pounder quick-firing guns. In 1894 the Ardent, which came, next, was 247 tons. Then followed in 1896 the Brazen of 300 tons, in 1898 the Albatross of 360 tons, which attained a speed of 32 knots. In 1899-1900 came the Viper, 312 tons, and the Cobra, 400 tons, the first vessels to be fitted with turbine engines; the former of these vessels was reported to have reached the hitherto unprecedented speed of 37 knots, the latter a speed of over 36½ knots; but both these ships were unfortunately lost. In 1902-3 came the Waveney, the Eden, and the

Garry, of 534, 527, and 600 tons respectively; and in 1906 we come to the Mohawk, the first of the "ocean going destroyers." This ship of 865 tons and 34.51 knots speed was succeeded by the Swift, which ship—to use the slang of the day—can only be described as a super-destroyer, as she is of 1,800 tons and 35.25 knots speed. Having arrived at this climax in destroyer tonnage, the constructors, reverted once more to ships of about half the tonnage, in the Amazon, 980 tons, in 1908, the Scourge, 925 tons, in 1909, the Acorn of 780, in 1910, the Acasta of 935, in 1912, and the Laurel of 965 tons, in 1913.

It will be seen from this list that the destroyer has emerged from the boat to the ship stage, and that speed and power have enormously increased. Whereas the Havock was 3,500 horse-power the Laurel class is 24,500 horse-power; and where the Havock carried one 12 and three 6 pounders the later vessels carry three 4in. (25lb. projectile), one machine gun, and two double torpedo tubes—that is, a species of double-barrelled gun for the firing of the torpedo above water.

We have already spoken of the battle cruiser, of the armoured cruiser, and the protected cruiser, and have passed briefly in review the different forms of torpedo craft. There are still two types to be considered—namely, the light cruiser and the submarine. The light cruiser may be considered as a connecting link between those vessels that are specifically denominated torpedo craft and the larger cruiser type which come under the heading of protected cruisers. Leaving on

one side earlier specimens of the genus, we may mention the Blanche and Blonde, the date of completion of which was 1910 and 1911 respectively. They are 3,350 tons, their turbine engines develop 18,500 horse-power, their speed is 25.43 knots, and their armament consists of ten 4in. guns, four 3-pounders, one machine gun, and two submerged torpedo tubes.

A brief survey of the evolution above described may here serve as a pendant to what has been already said about the enormous cost entailed on all naval Powers by the advent of the locomotive torpedo. At first the torpedo was regarded by the naval authorities of this country as essentially or, at least, pre-eminently the weapon of the weaker naval belligerent, of an enemy who, acting on the defensive, was specially solicitous for the defence of his coasts and harbours. Hence it was not taken very seriously by a Power which never can shrink from blue-water conflict, and for this reason our provision of torpedo craft was comparatively meagre at the outset, and the boats were of very limited sea-going capacity. Some of them, described as "second-class" torpedo-boats, were even carried as part of the equipment of a battle-ship, to be hoisted out as occasion required. Even the "first-class" boats were hardly expected to take the sea in very heavy weather. But the experience gained in naval manœuvres from 1885 onwards showed that the torpedo-boat was by no means a negligible quantity even in the open sea. It showed also that the best defence against its attacks was an offensive defence

designed to hunt it down and compel it to lead the life of a fugitive. This was the genesis of the torpedo-gunboat or so-called "torpedo catcher." But the defect of the torpedo catcher was that it could not catch the torpedo-boat. Hence it was soon superseded by the destroyer. But the destroyer, after all, was only an enlarged torpedo-boat, a "torpilleur de haute mer" as the French call it, and soon in turn its primary function as a destroyer was merged in that of a torpedo-boat proper, that is, of a vessel designed not so much to catch torpedo-boats as to use its torpedoes rather than its gun armament in any and every form of naval conflict. As the range of the torpedo increased its gun armament began to suffer from the disabilities inherent in its type. The size of the vessel, though steadily increasing, did not admit of the fitting of those appliances for the control and direction of gunfire which are indispensable for accurate shooting at long ranges. It was possibly in anticipation of some such result as this that the Swift was constructed, though her design has not been repeated. This is perhaps because the development of the most modern type of light cruiser has superseded it. The light cruiser is, in fact, a "destroyer of destroyers" in one of its aspects, and in another the immediate support on which destroyers can fall back when they are too hardly pressed Thus the evolution is continuous from the puny torpedo-boat of the early days of the locomotive torpedo to the light cruiser, the "destroyer of destroyers," whose achievements in the present war have already more than

justified the foresight of the Admiralty in its design and construction. Whether the evolution is even yet complete is a question which the future must determine

Of course light cruisers have many other functions to discharge, and we may here note that one of the older of the class, H.M.S. Pelorus, of 2,135 tons, dating 1896, not long ago ascended the river Amazon in South America for some 2,000 miles. Naturally no man-of-war, or in fact any vessel of any description of so large a tonnage, had ever ascended this mighty stream so far into the interior of the continent, and her appearance in the upper reaches, where she was actually nearer to the Pacific than to the Atlantic Ocean, caused great excitement and wonder among the natives.

The latest Admiralty return gives us three newer classes of light cruisers, that is to say subsequent to the Blondes, a class of seven ships. These are the Bristols, five ships of 4,800 tons; the Weymouths fours ships of 5,250 tons; and the Chathams, three ships of 5,400 tons. There were at the outbreak of the war three more of this class yet to be completed another class, of 3,250 tons, of eight ships, and another also of eight ships, of 3,800 tons. Very rightly the Admiralty take no one into their confidence; all the same we have evidence that already one of these cruisers of the 1913 programme, the Arethusa, has been got to sea, and has demonstrated to the enemy in the action in the Heligoland Bight how useful a craft she is. For their size these latest of the light cruisers are very powerfully armed; the Arethusas carrying two

6in. and six 4-in. guns, and four torpedo tubes discharging the latest pattern torpedo of 21-in. diameter. Being designed for a speed of 30 knots they are also capable of making their presence felt in any area without much delay.

The submarine, like its sister the torpedo-boat, had but small beginnings, and in the first instance was taken up more enthusiastically in France than in our own country. In 1903 the French built the Alose, a boat of only 60 tons; but in 1912, so rapidly had submarine construction advanced that the Gustave Zédé was no less than 787 tons. In our own service the tonnage of A2 was 180, her surface speed was 12 knots, her submerged speed was seven knots, she was 100ft. long, and 12ft. 6in. in diameter, with two torpedo tubes. Since then tonnage has risen rapidly, to 316 tons in the "B's" and "C's" of 1906-9, to 321 tons in the later "C's" of 1909-10, and to 620 tons in the "D's" of 1911-12.

No more official information has been given to the public concerning the future submarines; it is known that they are to be of greatly increased size and already 1,500 tons is spoken of as a reasonable tonnage. In the present form of submarine the handling of the torpedo inboard is one of the difficulties with which the crews have to contend; the great length of the torpedo compared to the beam of the ship renders a broadside installation of tubes a difficulty which has not yet been overcome in any submarines of which we have official information. There is talk of submarine cruisers,

vessels of considerable size and power, which will be able to manœuvre at will either on or below the surface. In the meantime an idea was put forward in the "Rivista Maritima" eighteen months ago of a torpedo battleship. The writer of the article in which this idea was embodied was the late General Cuniberti, of the Italian naval constructional staff, to whom we have already alluded in relation to his article on "An Ideal British Battleship." His British battleship idea materialized in the Dreadnought and subsequent ships, and it is not impossible that we may also see the newer idea take shape in the fulness of time.

The latest and not the least formidable agency to make its appearance in the field of warfare is that of aircraft. But this agency is common both to the Army and to the Navy—though with some differences of structure and equipment—and for that reason it is more fully discussed in the volume issued by *The Times* on the Army. Naval aircraft need for the most part to be fitted with suitable appliances to enable them to descend and float on the water, but in other respects they do not differ essentially from military aircraft. Alike on land and on sea their value for scouting purposes is unique and incomparable. The present was has also shown that they possess no little offensive power on land in their ability to drop bombs in localities where much harm may be done to the enemy. It may be that sooner or later this offensive power will be shown to be equally great, if not greater, at sea. But a warship

is not a very large target to hit from a great height, whereas an airship should be no very difficult target to hit at a moderate height. Be this as it may, the value of aircraft in sea-patrol service was publicly attested by the Admiralty at the beginning of October.

There are besides the types of ships that have already been mentioned a number which may be classed as miscellaneous. They do the endless jobs that are connected with the sea service. There are, for instance, six torpedo depôt ships, that attend to the needs of the torpedo-boat and destroyer flotillas ; and six submarine depôt ships that perform the same office for the submarines. These vessels move around our coasts in attendance on their charges of torpedo craft and submarines, and they contain nearly everything that is necessary for the flotillas. The obvious advantage they possess is that their presence makes it unnecessary for the different units of the torpedo service perpetually to be returning to the dockyards to make good minor defects. The mine-laying squadron, again, consists of seven old cruisers of the Apollo class dating from 1891. These ships are kept ready to mine any selected area that it may be deemed necessary to defend ; and at the beginning of October the British Admiralty announced that on military grounds they had found it necessary to adopt a mine-laying policy in certain areas, though for two months after the outbreak of war they had refrained from imitating the German policy in this respect. Due measures, however, were taken to warn vessels engaged in peaceful avocations.

In addition to mine-layers, there are also mine-sweepers. Of these some are old torpedo gunboats that have been fitted out for this service; the remainder are steam trawlers, which have been found to be singularly serviceable for this perilous pursuit. Of what are known as repair ships the Navy possesses three, the Cyclops of 11,000 tons, the Aquarius of 2,800 tons, and the Assistance of 9,600 tons. These vessels are elaborately fitted up and attend to the larger units of the fleet, again saving many trips to the dockyard by performing necessary repairs on the spot.

The ships employed in the surveying service are eight in number. They are under the direction of the Hydrographer of the Navy, and their business is that of charting all the seas of the world. Out of sight and out of mind for the most part, the surveying service never ceases its beneficent labours, which enable warship and merchant vessel alike "to pass on the seas upon their lawful occasions." The P. and O. passenger thinks that he would rather not go through the Red Sea in August, and his sense is much to be commended, But the surveyor stops his work for neither heat nor cold and whether his theodolite is decorated with icicles or the metal of his sextant sears his face if it should chance to make contact with the skin, he pursues his undeviating way. Two instances of this may be given to demonstrate the unwearied persistence of the surveyors. Some years ago in China it became necessary for the purposes of the survey proceeding on that station to determine the exact latitude of one of the

Saddle Islands, at the mouth of the Yang-tse-Kiang.

The surveying ship arrived and anchored off the selected island. Then it rained without any sort of intermission for a week, and neither sun, moon, nor stars were visible. A lieutenant with a boat and boat's crew of five men was left behind on the island while the ship proceeded elsewhere to do other work. They had a tent, food, and instruments for the survey; it rained then for another fortnight while they sat in the tent. Eventually the sun came out, the observations were taken, and they returned from the sea of liquid mud in which they had been existing to the comparative comfort of the surveying ship. Again, there is in the Red Sea a pinnacle rock known as the Avocet Rock; it lies in deep water right in the track of every steamer that makes the Straits of Bab-el-Mandeb bound either north or south. For many years after the opening of the Suez Canal the steamers passed up and down, but none received any damage from this lurking foe, the presence of which was quite unsuspected. Then one day a steamer named the Teddington, while making her southing, fell in with a stiff head gale. Lifting on the crest of a sea she came down with crushing force on the top of the pinnacle rock; her bottom was torn out and she foundered on the spot. The crew made their way in boats to Aden and reported what had happened, but nobody believed a word that they said. When, however, a month later precisely the same thing happened to another steamer called the Avocet a surveying ship was sent to find the rock. For weeks they searched,

but to look for a needle in a bundle of hay would have been easy work in comparison. They gave it up and said they could find no trace of this rock. They were sent back to look again, and one day an able seaman sounding listlessly from a boat with a hand lead in uncounted fathoms of water, lowered his 7lb. lead exactly on top of the pinnacle. There was only 18ft. of water on it, it was out of sight of land, and it stood entirely by itself without another rock within miles of its neighbourhood.

The class of miscellaneous ships includes one that is used as a diving school for the men and officers of the Navy, a special collier of large tonnage, and four special petrol or oil vessels. There is also the Sphinx, an old paddle steamer, that is used in the Persian Gulf, as she is fairly roomy, and in consequence not quite so purgatorial a ship in which to live as the ordinary steel built small cruiser in the awful heat of a Gulf summer. There are besides His Majesty's royal yachts, coastguard cruisers, and troopships. Last, but perhaps not least, come the river gunboats, used for the most part on the great rivers in China. We have already spoken of the wonderful voyage of the Pelorus up the Amazon. She went and she came back, for she had never any intention of remaining in the upper reaches of the river. It is otherwise on the Yang-tse-Kiang in China. Quite early in our relations with "the flowery land" Hankow was opened to trade as a treaty port, and Hankow is 600 miles from the sea. In 1873 Ichang, a port some 400 miles further up the river,

was opened and a Britis gunboat was sent up; not it would appear, much to the satisfaction of the inhabitants, who pelted the crew with mud and stones, incited their dogs to bite the strange mariners, and drove water buffaloes down narrow lanes in the hope of catching and crushing them to death. As the years went on, however, the Chinese in this part of the Empire became more reconciled to the Fanqui—or foreign devils—and now a gunboat lies stationed at Chunkingfoo, some thousand miles beyond Ichang, whence the British bluejacket looks out on the peaks of the Tibetan mountains, being considerably nearer to the Indian Ocean than to the China Sea. The ascent of the river is not accomplished without difficulty and peril, as numerous rapids have to be traversed. The way in which these rapids were negotiated originally was to have hundreds of men on either bank towing the ascending vessel with immense coir cables, she of course using her own steam to assist. But there came a day at last on which a ship was sent out from England that disdained to be towed and ascended the rapids under her own steam alone. There in Central China the inhabitants came from far and near to see, as they felt perfectly assured that they would see, this audacious steamer taken in hand by the furious stream and rolled to destruction at the bottom of the rapids. They were disappointed; slowly, but surely, she mounted and emerged triumphant and unscathed at the top. Mariners who have come down these same rapids describe it as quite as exciting an experience as anyone need desire.

CHAPTER V.

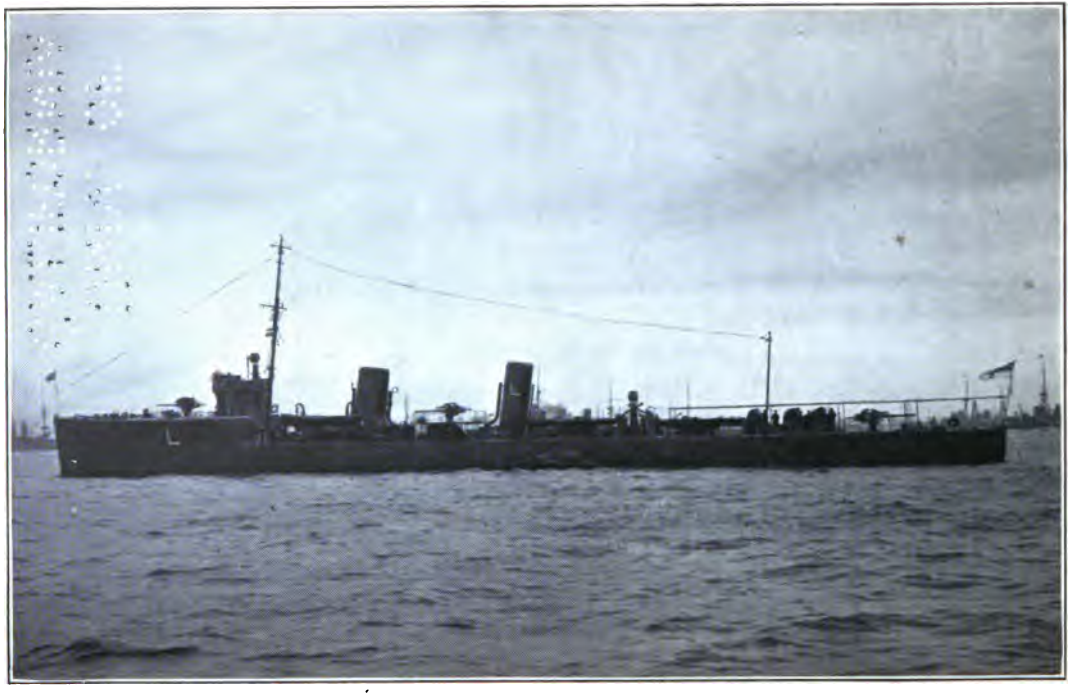
THE FLEETS AFLOAT.

THE NAVAL FORCES OF THE CROWN—THE FORCES ABROAD AND THE FORCES AT HOME AT THE OUTBREAK OF THE WAR—COMPLETE LISTS OF BOTH.

HAVING now defined the work of the Navy and described the chief types of ships by which it is carried on, we may next proceed to consider the actual composition of the fleets engaged in the prosecution of this work. This composition may be illustrated by reference to the position as it stood at the beginning of the Great War. Our principal defence on the seas against the Germans —whose whole naval force, with few and insignificant exceptions, was concentrated either in the North Sea or in waters from which the North Sea is readily accessible —has for many years past been stationed in that sea, or in other adjacent home waters. That is, our main battle fleets have for many years past been there or thereabouts together with such of their associated cruisers and flotillas as were engaged in patrolling our own coasts. But it was never intended that in

times of war all our cruisers should necessarily be confined to the North Sea. For instance, during the present war cruisers have been employed in scouring the Atlantic, acting either singly or in pairs, or even in small squadrons, in pursuit of the few German cruisers and armed merchant vessels which had managed for a time to elude capture and were at large on the more distant ocean routes.

It is also necessary to mention briefly the naval forces abroad. These could not, of course, take an immediate part in the campaign in home waters, but they could be, and were none the less, employed in the work common to all our armed forces afloat of keeping open the highways of the sea and of seeking out and pursuing such of the armed forces of the enemy as were within their range with a view to their capture or destruction. There was at the outbreak of war a considerable force in the Mediterranean. The Eastern Fleet comprised the East Indies Squadron, the China Squadron, and the New Zealand Division, and these could be reinforced by the Australian Fleet, which in times of peace is under the immediate control of the Commonwealth Government, but in time of war acts under the supreme direction of the Admiralty. There were three cruisers on the Cape Station and one or two detached cruisers on the West Coast of Africa, the South-East Coast of America, and the West Coast of America. Finally, there was the Cadets' Training Squadron, of no special allocation, consisting of the Cornwall, the Cumberland, and the Highflyer, the



viii. **H.M.S. LAUREL.** [*Symonds & Co.*

last-named of which has distinguished herself by the destruction of the Kaiser Wilhelm der Grosse. These outlying forces are of comparatively modest proportions. but the enemy was not likely to be strong in the waters they patrolled. It must also be borne in mind that all the units of all our fleets at home and abroad are at all times in direct communication by cable or wireless telegraphy with the central authority at the Admiralty, so that their action can always be controlled, directed, and coordinated to the best strategic purpose throughout the seas of the world.

From this brief survey of the outlying defences of the Empire on the seas we turn to the composition of the Grand Fleet in home waters. The term Grand Fleet is not, so far as we know, to be found in any modern official document, but it is a time-honoured appellation full of inspiring associations, and as Admiral Jellicoe employed it to describe his command we cannot hesitate to follow his example. No complete list of the Grand Fleet can be given at the time of writing. In the "Navy List" for September, 1914, nothing of the kind is to be found. But in its predecessor, issued in August and corrected up to July 18, there is given a complete list of all "Fleets and Squadrons in Commission," as then constituted, and this we here transcribe in full. It should be premised, however, that this list was compiled before the full mobilization of the Fleet had taken place or was even in contemplation, and that many changes and additions have certainly since been made. We have not thought it necessary

to strike out such vessels as have since been destroyed by the enemy. There are others ready or nearly ready to take their places. The list is as follows :—

FLEETS AND SQUADRONS IN COMMISSION.

HOME FLEETS.

FIRST FLEET.

IRON DUKE (*Commander-in-Chief's Flag*).

ATTACHED SHIPS.—Oak, Sappho.

BATTLESHIPS.

FIRST BATTLE SQUADRON.—Mariborough (*Flag*), St. Vincent (*Second Flag*), Colossus, Hercules, Neptune, Vanguard, Collingwood, Superb. LIGHT CRUISER.—Bellona. REPAIR SHIP.—Cyclops.

SECOND BATTLE SQUADRON.—King George V. (*Flag*), Orion (*Second Flag*), Ajax, Audacious, Centurion, Conqueror, Monarch, Thunderer. LIGHT CRUISER.—Boadicea. REPAIR SHIP.—Assistance.

THIRD BATTLE SQUADRON.—King Edward VII. (*Flag*), Hibernia (*Second Flag*), Africa, Britannia, Commonwealth, Dominion, Hindustan, Zealandia. LIGHT CRUISER.—Blanche.

FOURTH BATTLE SQUADRON.—Dreadnought (*Flag*), Temeraire, Bellerophon, Agamemnon. LIGHT CRUISER.—Blonde.

ATTACHED DESTROYERS.—Arun, Dee, Swale, Ure, Boyne, Cherwell, Erne, Exe.

CRUISERS.

FIRST BATTLE CRUISER SQUADRON.—Lion (*Flag*), Queen Mary, Princess Royal, New Zealand.

SECOND CRUISER SQUADRON.—Shannon (*Flag*), Achilles Cochrane, Natal.

THIRD CRUISER SQUADRON.—Antrim (*Flag*), Argyll, Devonshire, Roxburgh.

FOURTH CRUISER SQUADRON. —Suffolk (*Flag*), Berwick, Essex, Lancaster, Bristol.

FIRST LIGHT CRUISER SQUADRON.—Southampton (*Broad Pendant*), Birmingham, Lowestoft, Nottingham.

MINE-SWEEPING GUNBOATS.

Circe, Gossamer, Jason, Leda, Skipjack, Speedwell.

FLOTILLAS OF THE FIRST FLEET.

AMETHYST (*Ship of Commodore* (T)).

FIRST FLOTILLA.—CRUISER.—Fearless. DEPOT SHIP.—Woolwich. DESTROYERS.—Acheron, Archer, Ariel, Attack, Badger, Beaver, Defender, Druid, Ferret, Forester, Goshawk, Hind, Hornet, Hydra, Jackal, Lapwing, Lizard, Phœnix, Sandfly, Tigress.

SECOND FLOTILLA.—CRUISER.—Active. DEPOT SHIP.—Blake. DESTROYERS.—Acorn, Alarm, Brisk, Cameleon, Comet, Fury, Goldfinch, Hope, Larne, Lyra, Martin, Minstrel, Nemesis, Nereide, Nymphe, Redpole, Rifleman, Ruby, Sheldrake, Staunch.

THIRD FLOTILLA.—CRUISER.—Amphion. DEPOT SHIP.—Dido, DESTROYERS.—Laertes, Laforey, Landrail, Lark, Laurel, Lawford, Legion, Lennox, Liberty, Linnet, Llewellyn, Louis, Loyal, Lydiard, Lysander.

FOURTH FLOTILLA.—CRUISER.—Swift. DEPOT SHIP.—Hecla. DESTROYERS.—Acasta, Achates, Ambuscade, Ardent, Christopher, Cockatrice, Contest, Fortune, Garland, Hardy, Lynx, Midge, Owl, Paragon, Porpoise, Shark, Sparrowhawk, Spitfire, Unity, Victor.

SECOND FLEET.

BATTLESHIPS.

FIFTH BATTLE SQUADRON.—Prince of Wales (*Flag*), Bulwark, Formidable, Implacable, Irresistible, London, Queen, Venerable. LIGHT CRUISER.—Topaze.

SIXTH BATTLE SQUADRON.—Lord Nelson (*Fleet Flagship*), Russell (*Flag*), Cornwallis, Albemarle, Duncan, Exmouth, Vengeance. LIGHT CRUISER.—Diamond.

CRUISERS.

FIFTH CRUISER SQUADRON.—Carnarvon (*Flag*), Falmouth, Liverpool.

SIXTH CRUISER SQUADRON.—Drake, Good Hope, King Alfred, Leviathan.

MINELAYER SQUADRON.

Andromache, Apollo, Intrepid, Iphigenia, Latona, Naiad. Thetis.

PATROL FLOTILLAS.

PORTSMOUTH.—SIXTH FLOTILLA.

FLOTILLA CRUISERS.—Adventure, Attentive, Foresight. TORPEDO-BOAT-DESTROYERS.—Afridi, Amazon, Cossack, Crane, Crusader, Falcon, Fawn, Flirt, Ghurka, Gipsy, Greyhound, Kangaroo, Leven, Maori, Mermaid, Mohawk, Myrmiden, Racehorse, Saracen, Syren, Tartar, Viking, Zulu—*Tenders to Attentive.*

DEVONPORT.—SEVENTH FLOTILLA.

FLOTILLA CRUISER.—Skirmisher. DEPOT SHIP.—Leander. TORPEDO-BOAT-DESTROYERS.—Albatross, Arab, Avon, Bullfinch, Dove, Earnest, Leopard, Lively, Locust, Orwell, Panther, Quail, Seal, Sprightly, Success, Sylvia, Thorn, Thrasher, Vixen, Violet,

Wolf—*Tenders to Leander.* TORPEDO-BOATS.—Nos. 1, 2, 3, 4, 5, 13, 14, 15, 16, 21, 22, 24—*Tenders to Leander.*

CHATHAM.—EIGHTH FLOTILLA.

FLOTILLA CRUISER.—Pathfinder. DEPOT SHIPS.—Aquarius, Tyne. TORPEDO-BOAT-DESTROYERS.—Albacore, Bat, Cheerful, Express, Fairy, Flying Fish, Mallard, Osprey, Ostrich, Peterel, Stag, Star, Vigilant—*Tenders to Tyne.* TORPEDO-BOATS.—Nos. 25, 26, 27, 28, 29, 30, 31, 32, 34, 35, 36—*Tenders to Tyne.*

CHATHAM.—NINTH FLOTILLA.

FLOTILLA CRUISERS.—Forward, Patrol. DEPOT SHIP.—St. George. TORPEDO-BOAT-DESTROYERS.—Derwent, Eden, Ettrick, Foyle, Garry, Itchen, Kale, Liffey, Moy, Ness, Nith, Ouse, Rother, Stour, Test, Teviot, Waveney—*Tenders to St. George.*

SUBMARINES.

DEVONPORT.—THIRD FLOTILLA.

DEPOT SHIP.—Forth. B3, B4, B5, C14, C15, C16.

PORTSMOUTH.—FOURTH FLOTILLA.

DEPOT SHIPS.—Arrogant, Hazard. C17, C18, C31, C32, C33, C34, C35.

CHATHAM.—FIFTH FLOTILLA.

DEPOT SHIP.—Thames. C1, C2, C3, C4, C5, C6.

CHATHAM.—SIXTH FLOTILLA.

DEPOT SHIPS.—Bonaventure, Hebe. C7, C8, C9, C10, C12, C13.

CHATHAM.—SEVENTH FLOTILLA.

DEPOT SHIPS.—Vulcan, Alecto. C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30.

PORTSMOUTH.—EIGHTH FLOTILLA.

DEPOT SHIPS.—Maidstone, Adamant. D1, D2, D3, D4, D5, D6, D7, D8, E1, E2, E3, E4, E5, E6, E7, E8, E9.

DEVONPORT.—NINTH FLOTILLA.

DEPOT SHIP.—Pactolus. A10, A11, A12, and Bonetta.

THIRD FLEET.

BATTLESHIPS.

SEVENTH BATTLE SQUADRON.—Cæsar, Illustrious, Magnificent, Prince George, Victorious. LIGHT CRUISER.—Sapphire.

EIGHTH BATTLE SQUADRON.—Albion, Canopus, Glory, Goliath, Ocean. LIGHT CRUISER.—Proserpine.

CRUISERS.

SEVENTH CRUISER SQUADRON.—Cressy, Euryalus, Hogue, Sutlej.

EIGHTH CRUISER SQUADRON.—Temporarily not constituted.

NINTH CRUISER SQUADRON.—Donegal, Monmouth, Amphitrite, Challenger, Europa, Highflyer, Vindictive.

TENTH CRUISER SQUADRON.—Crescent, Edgar, Endymion, Gibraltar, Grafton, Hawke, Royal Arthur, Theseus.

ELEVENTH CRUISER SQUADRON.—Doris, Isis, Juno, Minerva. Venus.

TWELFTH CRUISER SQUADRON.—Charybdis, Diana, Eclipse, Talbot.

MEDITERRANEAN FLEET.

SECOND BATTLE CRUISER SQUADRON.—Inflexible (*Flag*), Indefatigable, Indomitable.

FIRST CRUISER SQUADRON.—Defence (*Flag*), Black Prince, Duke of Edinburgh, Warrior.

LIGHT CRUISERS.—Chatham, Dublin, Gloucester, Weymouth.

ATTACHED SHIPS.—Hussar, Imogene.

DESTROYER FLOTILLA.—DEPOT SHIP—Blenheim. Basilisk, Beagle, Bulldog, Foxhound, Grampus, Grasshopper, Harpy, Mosquito, Pincher, Racoon, Rattlesnake, Renard, Savage, Scorpion, Scourge, Wolverine.

SUBMARINES.—B9, B10, B11.

TORPEDO-BOATS (*in reserve*).—Nos. 045, 044, 046, 063, 064, 070.

GIBRALTAR.

SUBMARINES.—B6, B7, B8.

TORPEDO-BOATS.—Nos. 83, 88, 89, 90, 91, 92, 93, 94, 95, 96.

EASTERN FLEET.

EAST INDIES SQUADRON.—Swiftsure (*Flag*), Dartmouth, Fox, Alert, Espiègle, Odin, Sphinx.

CHINA SQUADRON.—Triumph, Minotaur (*Flag*), Hampshire, Newcastle, Yarmouth, Alacrity, Bramble, Britomart, Cadmus, Clio, Thistle. DESTROYERS.—Chelmer, Colne, Fame, Jed, Kennet, Ribble, Usk, Welland. SUBMARINES.—C36, C37, C38. TORPEDO-BOATS.—Nos. 035, 036, 037, 038. RIVER GUNBOATS.—Kinsha, Moorhen, Nightingale, Robin, Sandpiper, Snipe, Teal, Woodcock, Woodlark, Widgeon.

NEW ZEALAND DIVISION.—Psyche, Pyramus, Torch, Philomel (*training ship of New Zealand Naval Forces*).

AUSTRALIAN FLEET.

Australia (*Flag*), Encounter, Melbourne, Sydney. DESTROYERS.—Parramatta, Warrego, Yarra. SUBMARINES.—AE1, AE2.

CAPE OF GOOD HOPE.—Hyacinth (*Flag*), Pegasus, Astræa.

WEST COAST OF AFRICA.—Dwarf.

S.E. COAST OF AMERICA.—Glasgow.

WEST COAST OF AMERICA.—Algerine, Shearwater.

CADETS' TRAINING SHIPS.—Cornwall, Cumberland, Highflyer.

SURVEYING SERVICE (at Home and Abroad).—Daisy, Endeavour, Esther, Fantome, Hearty, Merlin, Mutine, Research, Sealark, Triton.

But even the foregoing does not display the whole of the Fleet as it stood before the war, still less that which has now been arrayed in full panoply against the armed forces of the enemy. Even for the former we must still add another page from the "Navy List," which enumerates:—

TORPEDO CRAFT AND SUBMARINE FLOTILLAS AT HOME PORTS.

IN ACTIVE COMMISSION.

SHEERNESS—CHATHAM.

Tenders to Actaon.—TORPEDO-BOAT-DESTROYERS.—Brazen, Coquette, Cygnet, Cynthia, Electra, Fervent, Kestrel, Lightning, Porcupine, Recruit, Vulture, Zephyr. TORPEDO-BOATS.—Nos. 6, 7, 8, 9, 10, 11, 12, 17, 18, 19, 20, 23, 072, 079, 111, 112, 113, 114, 115, 117.

PORTSMOUTH.

TORPEDO-BOAT-DESTROYERS.—Conflict, Firedrake, Lurcher, Spiteful, Velox, *Tenders to Vernon.* Angler, Desperate, Nubian, *Tenders to Excellent.* Surly, *Tender to Pisgard.* Roebuck, *Tender to Pomone.* TORPEDO-BOATS.—*Tenders to Victory*—Nos. 025, 034, 042, 80, 81, 82, 85, 86, 87, 101, 116. *Tenders to Vernon*—Nos. 078, 33, 98, 109, 110. *Tender to Racer*, No. 027. *Tender to Dolphin.*—No. 026.

DEVONPORT.

Tenders to Vivid.—TORPEDO-BOAT-DESTROYERS, Bittern, Opossum, Sunfish; and TORPEDO-BOATS Nos. 067, 99, 107, 108, 105; and 104 attached to *Defiance.*

QUEENSTOWN.

Tenders to Colleen.—TORPEDO-BOATS.—050, 052, 055, 058.

PEMBROKE.

Tenders to Vivid.—TORPEDO-BOATS.—033, 041, 045, 049.

SUBMARINES.

PORTSMOUTH.—SECOND FLOTILLA.—DEPOT SHIP.—Dolphin. SUBMARINES.—Nos. A5, A6, A13, B1.

DEVONPORT.—FIRST FLOTILLA.—DEPOT SHIP.—Onyx. SUBMARINES.—Nos. A8, A9.

CHAPTER VI.

THE STRUCTURE & EQUIPMENT OF WARSHIPS.

DISPLACEMENT—ARMAMENT PRIMARY AND SECONDARY—DISAPPEARANCE AND RE-APPEARANCE OF SECONDARY ARMAMENT—NET DEFENCE—WATER-TIGHT COMPARTMENTS—TORPEDO ARMAMENT—UNDER-WATER DISCHARGE—THE GYROSCOPE—THE GYRO-COMPASS—FIRE CONTROL—SOME OF ITS RESULTS.

IT would only weary and perplex the reader to give in this place all the distinguishing characteristics as regards armour, armament, displacement, horse-power, speed, and other data of all the vessels included in the vast armada enumerated at the end of the last chapter or of such others as may have been added to it at the general mobilization or afterwards. A general survey of this subject has already been given in the preceding chapters, and in the appendix to this volume will be found a complete list of all the vessels now in the fighting line of the Navy, together with such authentic data concerning them as are likely to interest our readers. This list is taken, with some omissions, from the tables given in the *Naval Annual* for 1914, and we have to thank Lord Hythe, the editor of that valuable publication, for his kindness in giving us permission to use the

information therein contained. A few general remarks on the subject will not here be out of place.

In the first place the term "displacement" is one which needs some explanation. Displacement means the equivalent weight of water, reckoned in tons, which a ship displaces when she is floating freely and at rest. It is therefore a variable quantity which depends on the depth to which the ship is immersed, and this again depends on the total weight of her hull *plus* the weight of anything which is placed within her hull. Every ship, moreover, is designed for a definite "load draught," the load being determined by the weight of the ship *plus* the normal or average weight of the contents she is intended to carry, and the draught being the depth, as measured in feet from keel upwards, to which she is immersed when she is carrying the load for which she is designed. Hence her displacement necessarily varies with the load she is carrying, and the displacement given in the tables is only that which corresponds to the designed load draught. The importance of this explanation will be apparent if we consider the data given in the Navy Estimates for 1914-1915 in respect of the Queen Mary, the latest of our battle-cruisers. The "mean load draught" of this ship is given as 28ft. and her displacement at that draught is given as 27,000 tons. We find, however, from another column that this displacement corresponds to a "coal or oil capacity at load draught" of only 1,000 tons. This is obviously a very meagre provision for a ship which is specially designed to steam at high speed and probably burns some 50 or 60 tons

of coal an hour, or an equivalent weight—some 33 per cent. less—of oil when she is steaming at full speed. But it would appear from the *Naval Annual* that the full bunker capacity of the Queen Mary is 3,000 tons, and it follows from the foregoing explanation that if she were loaded to that capacity she would displace 29,000 tons and her load draught would exceed 28ft. in a corresponding proportion. Nor is this all. The ship is designed to develop 75,000 "estimated horse-power at contractor's full-power trial," and the "corresponding speed at load draught, smooth water, clean bottom, on contractor's full-power trial" is given in the Navy Estimates at 28 knots. Thus it appears that displacement, load draught, and speed are all correlated figures which vary from day to day according to the changes in the ship's load and trim, while speed further varies very considerably according to the quality of the coal consumed, to the condition of the furnaces, and to the condition whether foul or clean of the ship's bottom. The speed given in the Navy Estimates is the speed which should be attained in the conditions indicated. But it happens not infrequently that this speed is exceeded after a ship has been for some time in full commission. This may be because the engineers in charge of the engines and boilers have brought them to a still higher state of efficiency than had been attained when they left the contractor's hands, or because the ship is steaming at the time with a displacement conducive to a higher speed than that which corresponds to the "designed load draught."

In a former chapter a general survey has been given of the armament of our modern battleships. Here it may not be out of place to give some further account of the *rationale* of the evolution there displayed. It will have been noted that in all the ships from the Royal Sovereign type onwards until we reach the King Edward VII. type, the armament was of a threefold character. There was a primary armament of 4 heavy guns—13.5in. in the Royal Sovereigns, now all obsolete and 12in. in all the rest—a secondary armament of ten to twelve 6in., and an anti-torpedo armament of a varying number of 12-pounder guns as well as a varying number of 6-pounder, 3-pounder, and machine guns. The secondary armament was at that time intended to take its full share in a fleet action. Many authorities, however, gradually came to hold that the primary armament was likely to prove so dominant at ranges at which the secondary armament would lose much of its effectiveness that the latter was not likely to come into play until the issue had been decided by the dominant fire of the primary armament. This opinion was, however, stoutly contested by other equally high authorities, and as both parties appealed with equal confidence to the varied experiences of the battle of Tsu-Shima in support of their respective views, the issue between them must still be regarded as an open one. Be this as it may, in the design of the King Edward VII. type there was manifested an endeavour to strengthen the primary armament more or less at the expense of the secondary armament.

These vessels are armed like their predecessors with four 12in. guns, but in addition they carry four 9.2in. guns, while their secondary armament proper is reduced to ten 6in. guns. They also carry twelve 12-pounders and seventeen 3-pounders and machine guns as an anti-torpedo armament. In the next type, that of the Lord Nelson and the Agamemnon —which though completed later than the Dreadnought were designed earlier—the 6in. armament disappears altogether, but the primary armament is largely reinforced by no fewer than ten 9.2in. guns, while the anti-torpedo armament is also increased to twenty-four 12-pounders and five machine guns. It may, perhaps, be a question whether the 9.2in. armament of this type is properly to be regarded as an auxiliary primary armament or a reinforced secondary armament; but that is a question which need not be decided nor even discussed here.

We have now reached a very momentous phase of the evolution we are considering. Without attempting to determine the issue above glanced at, we may point out that the interposition of the 9.2in. armament between the primary 12in. armament and the secondary 6in. armament in the King Edward VII. type and the complete supersession of the 6in. armament by the 9.2in. armament in the Lord Nelson type manifestly raised a further question of great and far reaching moment. For the primary armament of a battleship was it better to have a homogeneous armament or a mixed armament? The mixed armament would give a greater volume but not necessarily a greater

weight of fire, while the homogeneous armament—it composed of "all big guns"—would, or might, have a greater smashing effect. Would the enemy be more quickly disabled or destroyed by the well-directed fire of comparatively few big guns on the one hand, or, on the other, by the overwhelming hail of projectiles rained upon him by a larger number of smaller guns equally well directed? Much depends, of course, on the accuracy of aim of either type of armament, and it seems to be agreed among authorities on naval gunnery that it is easier to control and direct the fire of a homogeneous armament than that of a mixed armament. But even that consideration does not decide the question, which is not merely a material question but a psychological question as well. Target practice and the inferences legitimately to be drawn from it may seem to give results in favour of the all-big-gun armament, but then the target is not firing back. If at the time the all-big-gun ship is pounding the target the latter is pouring into that same ship an incessant hail of smaller but highly destructive projectiles, smashing everything that is not protected by heavy armour, filling the ship with flying splinters, and it may be blinding the gunners with spray cast up by projectiles which fall short, who shall say what may be the effect on the *moral* of the crew of the ship so assailed? We have no sufficient experience to answer the question and certainly no attempt can be made to answer it here.

Be this as it may the question was answered—

provisionally and temporarily at least—in favour of the homogeneous all-big-gun armament when the Dreadnought was designed. She carries no secondary armament at all. Her sole armament consists of ten 12in. guns together with an anti-torpedo armament of twenty-four 12-pounders and five machine guns. But the evolution did not end with the Dreadnought. More or less simultaneously with the evolution of the Dreadnought type there took place an immense development in the range and accuracy of the locomotive torpedo. Hence the anti-torpedo armament of the original Dreadnought rapidly became obsolete. So long as a torpedo craft had to come within a range of say 1,000 or even 2,000 yards of her prey before she could hope to discharge her torpedo with any reasonable prospect of success, it might be safe to rely on an armament of 3-pounder guns to stop her in time. But when the ranges of the torpedo rapidly grew to 4,000, 5000, and 7,000 yards, and possibly in extreme cases even to 10,000 yards, it manifestly became necessary to employ a much heavier armament to stop the torpedo craft in time. Hence all ships of the various Dreadnought and super-Dreadnought types built subsequently to the original Dreadnought have been furnished with an anti-torpedo armament of sixteen or more 4in. or 25-pounder guns, until in the Iron Duke type we come back once more to an armament of twelve 6in. or 100-pounder guns. In other words, the secondary armament discarded in the original Dreadnought has now been replaced in her latest successors. But the road by which it disappeared

is not exactly that by which it has returned. It disappeared because it was held by one school of naval thought to be superfluous in the battle conflict. It has reappeared, as the same school will insist, because in the change of circumstances it has now become necessary as an anti-torpedo armament. The opposing school may, however, reasonably contend that by whatever road it has returned it will when the time comes justify their views and its own existence in the battle conflict. We may leave the question at that.

Of course, when we speak of an anti-torpedo armament what is meant is a defence against torpedo craft, not against the torpedo itself. The torpedo, as is well known, is a steel, fish-shaped body which travels under water at high speed, being propelled by two screws which are driven by compressed air. It carries a large charge of explosive which is ignited on the torpedo striking any hard substance such as the hull of a ship. The body is divided into three parts. The foremost portion or head contains the explosive with mechanical igniting arrangements; the centre portion is the air chamber; and the remaining portion or tail carries the engines, rudders, and propellers, besides the apparatus for controlling depth and direction. Against this formidable weapon, when once it is launched, there is no direct defence by means of artillery. The thing is to stop the approach of the vessel which carries the torpedo before she has reached a point at which she can launch the weapon with any appreciable prospect of success, and for this purpose the so-called

"anti-torpedo armament" is provided. Against the torpedo itself there are several modes of defence, none of them very satisfactory. If the ship assailed is at anchor she can surround herself with steel netting strong enough to explode the torpedo at a distance from the ship sufficiently great to render its explosion comparatively innocuous. The net is suspended from booms pivoted to the ship's side, and capable of being rigged out at right angles thereto with the nets suspended from their outer extremities. But although the rigging and unrigging of this net defence can be very rapidly effected yet, save in very exceptional circumstances, its efficacy is more than doubtful. It can only be used when the ship is at rest or steaming at very slow speed, and the circumstances must be very rare in war which would justify so hazardous a sacrifice of so large a measure of that mobility which is one of the warship's most vital characteristics. Moreover, the protection it affords can be defeated by affixing to the nose of the torpedo a suitable cutting instrument so adjusted as to cut through the net and give passage to the torpedo. Another mode of defence would be for the ship assailed so to manœuvre as to get out of the way of the torpedo. This may sometimes be feasible, because in ordinary weather the advent of the torpedo can generally be discerned at a considerable distance by means of the long string of foam and bubbles which it leaves behind in its passage. But that, of course, is a method which is available only in the daytime, whereas the best opportunity of all surface torpedo craft comes in the night.

A further defence against the torpedo is in some measure afforded by the structure of the ship. A modern warship is subdivided up to, or in many cases above, the water-line into a large number of water-tight compartments so separated from each other by transverse steel bulkheads that if by the rupture of her side water obtains admission into any one of these compartments it cannot penetrate into any of the others. The explosion of a torpedo against the side of such a ship could only open up one or two of these compartments to the entry of water. Even this, however, would not in all cases sink the ship, though it would certainly disable her for a time and probably compel her to haul out of action in a condition which would gravely increase the risk of her capture or destruction by the enemy. Thus the defence against the torpedo by means of structural subdivision is really rather a palliative than a defence properly so-called. In point of fact, the best defence against torpedo attack of all kinds is a vigilant and vigorous offensive conducted in the first instance by torpedo craft and light cruisers, and in the last resort by the anti-torpedo armament of the ship attacked. But as against the submarine, when once it gets within range this latter mode of defence is denied to the ship attacked. The only thing is by means of the former mode of defence to make it as difficult as possible for the submarine to get within effective range. She must not be allowed to get within such a range if by any means she can be prevented. Even if she does the game is not all her own, as the Birmingham

ix. **H.M.S LENNOX, A NEW DESTROYER OF THE L TYPE.**

Cribb, Southsea.

has already shown. For the rest the game is always one at which both parties can play.

Of the gun armament of a warship all is said that need be said in other chapters of this book. But the gun armament is not the only armament. All ships—with few, if any, exceptions, are provided with a torpedo armament as well. In torpedo craft proper the torpedo armament is, of course, the principal armament, the very *raison d'être* of the vessel. In larger ships it is at best a subsidiary armament, but nevertheless an armament which may yet be found to play a very important part in a naval battle. A line of battle viewed obliquely—as it may very possibly come to be viewed in the course of a fleet action by the combatant who best knows his business—presents a target which a torpedo opportunely fired from so commanding a position can hardly miss. Moreover, the larger vessel possesses an appreciable advantage over the torpedo craft proper in that its torpedo is now always fired from a submerged tube. It has long been realized that the proper place for a torpedo tube on board a battleship or other large ship of war is below the water-line. The reasons for this are fairly obvious. In the first place, it is necessary that the torpedo tube and the torpedo should be in as safe a place as possible so as not to be damaged by the fire of the enemy. But an equally important reason is that if the torpedo tube is placed above the water-line, the torpedo in its discharge must drop a certain distance before it strikes the water. In striking the water it will inevitably be deflected to some extent. This deflection

will eventually be more or less corrected by the gyroscope, but the accuracy of fire from an above-water tube will never be as good as from one below the water-line.

Submerged torpedo tubes exist now in all navies, and from these excellent practice can be made. They differ in some details, but the general principle in all is the same, namely, that the torpedo, when discharged from below the water-line of a ship, must be protected in some way, from the moment when its nose protrudes from the side of the ship until its tail is clear of the ship's side. If the ship were travelling through the water at the rate of 20 knots the torpedo, in its discharge, would be dragged through the water at the rate of 33ft. per second. The strain imposed upon it would be very great and would render its discharge impossible as the torpedo would jam in the opening in the ship's side and break off at the tail joint.

To obtain the necessary protection some form of screen is employed. This consists of a "bar" or "spoon" projecting out from the ship's side, of a length equal to about half the length of the torpedo. Guides of some form are attached to the torpedo, and these travel in grooves in the spoon. The guides themselves being attached to the centre of the torpedo, it will be evident that when they reach the ends of the grooves and so run off the spoon the tail of the torpedo will be clear of the ship's side. In some designs this "bar" or "spoon" is run out previous to the discharge of the torpedo; in others it is fired out at the same time as the torpedo itself, and returns automatically after the torpedo has left. This

latter arrangement possesses the great advantage that, as the spoon is only out for a very brief period, the speed of the ship is interfered with only to a very small extent. In the case of a bar being left out for a considerable period, when the ship is travelling at a high rate of speed, a very material reduction of speed will result, which may be as much as 1½ knots in the case of a bar projecting from each side of the ship.

The torpedo tubes themselves consist of a vessel of a cylindrical form, one end being securely attached to the ship's side and fitted with a sluice valve, which must, of course, be opened before the torpedo is discharged. The torpedo is loaded into the torpedo tube either through a door at the rear end of the tube or through a long door in the side of the tube. This latter arrangement is adopted in most modern ships, as by this means a considerable amount of valuable space can be saved. As the torpedo is loaded it takes against a "stop" in the torpedo tube. This stop holds the torpedo in position, but is automatically withdrawn when the tube is discharged. Elaborate safety devices are provided to ensure that the torpedo cannot be discharged unless the sluice valve in the ship's side is open, that the rear or side door cannot be opened unless the sluice valve is closed, and for other purposes. The usual method of discharge is by means of compressed air, cordite or powder.

In order that the tube may be discharged at the correct moment a firing director is provided, placed usually in the conning tower or some suitable position on the

upper deck. This consists of a sighting device placed at the same angle to the keel as the torpedo tube itself, and provided with a firing key, which, when depressed, causes an electric current to operate the firing valve of the torpedo tube. The director is provided with means for making allowances for the speed and course of the enemy, as well as for the speed of the torpedo itself.

The angle at which the torpedo is placed to the keel of the ship is one which has been much discussed. From the point of view of easy discharge of the torpedo, an angle well before the beam is the best, but the general opinion, from a tactical point of view, seems to be in favour of having the tube installed at about an angle of 90deg. from right ahead. In the earlier submerged tubes an attempt was made to train them, but the complications were found to be so great that the idea was abandoned and fixed tubes are now universally adopted.

The accuracy of modern torpedo practice is entirely due to the use of gyroscopes, as these instruments constantly correct the course of the torpedo, keeping it travelling in the same direction as that in which it was discharged, or in any other pre-determined direction. The gyroscope constantly corrects the direction of the torpedo for any deflection which it may experience at the moment of its release from the " bar " or " spoon." A certain amount of deflection is inevitable, due to the fact that at the moment of release of the torpedo pressure of water is acting on its forward part, whilst the tail portion is to a large extent protected by the spoon.

On another page we give an illustration of a

submerged tube as designed by the famous Elswick firm of Sir W. G. Armstrong, Whitworth, and Co. (Limited). We are indebted to the courtesy of that firm for permission to use this illustration as well as for some valuable notes on the subject.

The mention of the gyroscope in connexion with the torpedo invites some further elucidation. It is well known that a rapidly rotating body, whether in the form of a ring, wheel, disc, or any other symmetrical body of circular section, will, if freely suspended in space, maintain its original plane of rotation. Such a rotating body, generally in the form of a ring or wheel is known as a gyroscope. The tendency of the gyroscope to maintain its plane of rotation is utilized for the purpose of controlling the direction of a torpedo. In the torpedo the instrument is mounted in double gimbal wheels so as to be free to turn in all directions. When the torpedo is fired the gyroscope is set spinning with its axis of rotation parallel to the intended course of the torpedo. If the torpedo deviates from that course the fact that the axis of the gyroscope remains in the same direction as before changes the relative positions of the torpedo and its gyroscope ; and this change of relative position is employed to control the steering engine which moves the rudders so as to bring the torpedo back to its original direction. This is one of those uses of the gyroscope which have rendered immense service to the art of naval warfare. It has increased in a fourfold if not a fivefold measure the effective range of the torpedo.

Another and not less important application is to the mariner's compass. Every form of compass which depends on magnetism for its directive agency is subject to very serious disabilities when placed in a ship constructed of steel or iron. Many of these disabilities can be corrected, compensated, or allowed for in the modern magnetic compass, but there are others which are so intermittent and so variable that they cannot be so corrected. In the *Naval Annual* for 1914 it is stated that "In some modern Dreadnoughts, where the standard compass is near the forward smoke-stack, a shift in the wind from forward to aft will cause a change in the deviation of from 2deg. to 5deg. by reducing the cooling effect of the air on the steel of the smoke-stack. Records show that when steering by even the best magnetic compasses the constantly changing deviation gradually leads the ship from her true course. In submarines, where accuracy in underwater navigation is absolutely essential, little dependence can be placed upon the magnetic compass because of the inaccuracies introduced by stray magnetic fields from the cables. The deviation caused by these stray magnetic fields changes with the load on the cables and with the changes in the fore and aft inclination of the keel."

Inherent and incurable disabilities such as these have for some time past stimulated many attempts to discard magnetism altogether as the directive agency of the mariner's compass and to substitute for it the action of the gyroscope. The problem is comparatively simple in theory and in principle, but in practice it

is by no means easy of solution. The essential property needed in a mariner's compass is that it should always point in a fixed and known direction relative to the surface of the earth. If we consider a gyroscope freely suspended anywhere on the earth, except at one of the poles, we shall find that as the earth rotates the direction relative to the surface of the earth in which the axis of the gyroscope points must be constantly changing unless the axis of the instrument is parallel to that of the earth. This proposition rests upon geometrical considerations which need not here be set forth. If then we can set a gyroscope spinning with its axis parallel to that of the earth it will possess the essential property above defined as required in a mariner's compass. The gyroscope has other peculiar properties which greatly complicate the practical problem involved in the construction of a gyro-compass, but a full consideration of these properties and their bearing on the practical problem would here be out of place. It must suffice to say that of the many attempts that have been made to produce a working gyro-compass two only have been so successful as to justify the introduction of the instruments into the ships of H.M. Navy. Of these the first in date was a German invention, named after its inventor, the Anschutz compass. The other, a later invention of American origin and construction, is also named after its inventor, the Sperry compass. Both instruments are now of approved efficiency, but the Sperry compass is generally held by experts to be the more efficient of

the two. Both are capable of being mounted in a protected position below the water-line and of being connected by suitable appliances to repeating compasses in any part of the ship ; and such repeating instruments suitably connected can be made of a size which is readily portable. The Sperry compass has also this great advantage, that in it the natural errors which are incidental to all compasses depending on the gyroscope for their directive agency are all corrected at their source by automatic appliances attached to the master compass. We cannot here enter into further details concerning these compasses, but we may mention that an interesting and not too abstruse account of the Sperry compass is given in the *Naval Annual* for 1914, p. 361.

It is hardly necessary to dwell on the superiority of the gyro-compass over the magnetic compass, equal efficiency after their respective kinds being pre-supposed in both. It eliminates magnetism altogether and provides an instrument of navigation which is unaffected by any agency—other than the rotation of the earth—external to itself, and points always not to the magnetic north, which is variable, but to the true pole of the earth. Moreover, it is not merely useful for purposes of navigation. It is found to have many useful applications in the modern system of fire control. That, however, is a subject which can only be glanced at here. Twenty years ago target practice was usually carried on by British warships at a range not exceeding 2,000 yards. Nowadays the same kind of practice is habitually carried on at a range of from 10,000 to 12,000 yards,

and it is no exaggeration to say that the average accuracy of aim at this vastly increased range is much higher than that formerly attained at the comparatively puny range of 2,000 yards or less. The secret of this amazing development is to be sought in the words "fire control" and all that they imply. It is manifest that to open fire in action at a range of 10,000 or 12,000 yards would be futile, and even absurd, unless there were a reasonable prospect of hitting the object fired at. This can only be achieved by extreme accuracy in the shooting, and such extreme accuracy at the ranges specified is by no means so easy of attainment as the mere landsman might suppose. It is attained through the agency of fire control.

Several methods of fire control are in use in different navies, but they all involve the organic co-ordination and instinctive cooperation of the many heads and many hands employed in the handling of the many delicate instrumental agencies of observation, calculation, and direction required for the elimination of those innumerable sources of possible error which, if left uncorrected, would disturb, if not wholly defeat, the ultimate accuracy of the firing. No attempt can be made here to describe this system in detail. It is very complex, many parts of it are confidential, and it is constantly undergoing change and improvement. But in lieu of any such attempt the writer will recount his own experience of some of the results attained by it. A few years ago he was a guest on board one of the battleships of what was then known as the Atlantic

Fleet while she was engaged in the exercise known as "battle practice" in the open Atlantic off Bantry Bay. It was the first time that any ship had carried out such a practice in such conditions. Previously it had been usual to wait for smooth water conditions when battle practice was to the fore. But on this occasion the ship was ordered to go into the Atlantic and to take the weather as it came. It was a clear day, but a fresh breeze was blowing and a sea was running, which caused the ship to roll some six or eight degrees either way. The ship was steaming some 14 knots and her course was slightly altered from time to time so as to present the target to the guns at different angles of bearing. The target was 90ft. in length by 30ft. in height, composed of canvas stretched upon masts and battens, and mounted on a stout raft which was towed by a cruiser at the end of a long hawser so as to place the towing cruiser at a safe distance from the line of fire. Its speed and course were unknown on board the firing ship except to the extent that the speed could not exceed six or eight knots lest the towing hawser should part, while the course must be maintained at a wide angle from the line of fire lest the towing cruiser should be imperilled. The sea was so high that as often as not not more than half the height of the target was visible from the firing point, the lower half being hidden by the crest of an intervening wave. In these conditions the practice was carried out. Its results caused much disappointment to the gunnery staff of the ship because the number of hits scored was appreciably less than

the average previously attained in smooth-water practice. But this practice was carried out in conditions which were at the time quite unprecedented, and in such conditions the results seemed to the writer at any rate to be very remarkable. It may have happened to some of our readers to shoot driven grouse on a windy day. They probably considered themselves in fairly good form if at the end of the drive they gathered one grouse for every four, perhaps for every five, cartridges expended. The number of hits recorded on the occasion in question approximated to the higher of these two averages rather than to the lower. Moreover, having regard to the size of a battleship in all three dimensions as compared with that of the target, it may be taken as certain that in real action many more projectiles than were recorded as having hit the target would have found their billet within the ambit of an enemy's hull. It must always be remembered, however, that a target does not fire back while an enemy does.

CHAPTER VII.

THE GUN, THE PROPELLANT & THE PROJECTILE.

THE ELIZABETH JONAS—THE MARIE ROSE (1509-1545) AND HER GUNS—PARALLEL WITH THE PRESENT DAY—MUZZLE-LOADING RIFLED GUNS—EARLIER BREECH-LOADERS—THE 110-TON GUN—GUNPOWDER AND SMOKE—GUNS OF MODERN NAVY—RANGE—CORDITE—ITS COMPOSITION—"POUDRE B."—THE ARMOUR PIERCING PROJECTILE—COMMON AND SHRAPNEL—H.M.S. EXCELLENT—THE NAVAL UNIVERSITY—ITS TEACHING OF OFFICERS AND MEN.

A CONSIDERABLE amount of water has flowed beneath the bridges since a treatise written by William Bourne upon guns and gunnery first saw the light. It was published in 1587 — the year before the Armada fight — and bears as its title "The Arte of Shootinge in Great Ordnance. Contayning very necessary matters for all sorts of servitours eyther by land or by sea." Even in those days the "servitours" had a wide choice of guns from which to fire in the same vessel. In a previous chapter it was stated that when H.M.S. Warrior was built in 1860 the 68-pounder was the

heaviest gun afloat. At the time of Bourne's book the "cannon royal" was the most powerful. It was a muzzle-loader, 11ft. long, of 8½in. bore, and fired a projectile weighing 60lb. In three centuries the gun had progressed but little. "The great ship" Eliza, beth Jonas of 1588 was armed with 50 guns, the term "great ship" being the equivalent Elizabethan term for the "line of battleship" of the 18th and 19th centuries and the "battleship" of the 20th. Of these 50 guns, 34 were heavy and 16 light. She mounted in her heavy battery demi-cannon, 30-pounders; cannon perier, 24-pounders; culverins, 17-pounders; demi-culverins, 9-pounders; what was the exact proportion of each is not known. Of the 16 light guns carried, she had a choice among sakers, 5-pounders; minions, 4-pounders; falcons, 3-pounders; falconets, 1½-pounders; robinets, bases, and murderers, each about 1-pounders, and a short-range gun called a perier, which was loaded with anything that came handy, such as a handful of broken stones from the ballast.

It might not appear that such cannon as these had much in common with the guns of the present day; but some of them embodied the most modern principle of all —namely, that of the central tube reinforced with a lashing. The largest guns mounted in the British Navy to-day are composed of an inner rifled many-grooved tube wound round with successive layers of a flat steel ribbon, the whole encased in an outer tube or tubes, and are technically known as "wire-wound guns." The Marie Rose, built in 1509, capsized

and foundered off St. Helens in the Isle of Wight in 1545. In 1903 there were fished up from the bottom of the sea three guns that unquestionably had belonged to this ill-fated vessel. They are built of longitudinal bars of iron, the interstices between which are filled in with wood, the whole being bound and wrapped together with tarred hemp rope.

The smooth bore cannon of varying weights and sizes was the arm of the sailing navy. We have seen how H.M.S Victory carried long 32-pounders on her lower deck, 24-pounders on her middle deck, and 12-pounders on her main and upper decks. In the three-decker the heaviest ordnance was placed naturally nearest to the waterline; and in her case it will be observed that she had not the same remarkable number of types as were carried in the Elizabeth Jonas. Owing to the extremely short range of these smooth-bore cannon, it was necessary to fight in close proximity to the foe, and resolute captains made a practice of getting as near as they could in order that when, or even before, the fire of the enemy began to slacken his ship might be taken by the primitive—but eminently satisfactory—method of boarding. With the ironclad came the rifled gun, but not the rifled gun as we know it to-day, as in its earlier manifestations it remained a muzzle-loader. Perhaps the only occasion on which the heavy rifled muzzle-loading gun was ever used in a general action of importance was at the bombardment of Alexandria by the fleet under Admiral Sir Beauchamp Seymour, afterwards Lord

Alcester. Among the ships employed on this occasion was the turret ship Inflexible of 11,880 tons, which was armed with four 80-ton 16in. guns having a length of bore of 288in., or the equivalent of 18 calibres. These guns, as well as the next heaviest M.L. then in the service, the 38-ton gun with a bore of 12.5in., were "chambered," that is to say, the rear inside portion of the bore was enlarged. In the 80-ton gun the chamber was 18in. in diameter, in the 38-ton gun 14in. The length of the chamber in the Inflexible's guns was just under 6ft.; in the 38-ton gun it was 3ft. 5in. In 1882 the modern cordite and other nitro explosives had not been invented, and the artilleryman on shore or afloat had to content himself with powder. The powder used in these big M.L. guns was what was known as "prismatic brown." A charge for an 80-ton gun was 450lb. of this compound, and it was divided into eight separate sections of octagonal shape, four of which were rammed home at a time by a ponderous hydraulic rammer. The projectile fired by this gun weighed 1,684lb., and at a range of 2,000 yards its penetration was 21.3in. of wrought iron. Another of the ships employed in this same bombardment was H.M.S. Monarch, the armament of which consisted of four 25-ton M.L. guns in two turrets, two 12-ton 9in. guns, and one 6½-ton gun. The 25-ton M.L. was a 12in. gun; the charge of which was 85lb. of pebble powder, and the gun discharged a projectile weighing 608lb. The 6½-ton gun was a 7in. weapon discharging a projectile of 112lb. in weight.

In this operation of war, that is to say the bombardment of Alexandria, it is worthy of note that in all the first line ships employed—namely, the Inflexible (turret ship), Monarch (turret ship), Temeraire (barbette), Alexandra, Sultan, Invincible, Superb, and Penelope—there was not a single large breech-loading gun mounted; and further, that in the forts to which the fleet was opposed the case was the same. These strong places of arms had been brought up to date by the inclusion of rifled muzzle-loading ordnance supplied by the Elswick firm, and also mounted smooth bore guns, some of 15in. bore, and mortars of 20in. Subsequent to 1882 there ensued, in the domain of ordnance, a period of evolution during which guns both muzzle-loading and breech-loading were used in the Navy. We speak familiarly to-day of the 13·5in. in use in our most modern battleships now afloat, and we anticipate the near future when the Queen Elizabeths will be in commission with 15in. weapons. If, however, we go back to 1886 we shall find that we then had afloat in several ships a 16·25in. breech-loading gun that weighed no less than 110½ tons. Hence a brief reference to the armament of the most powerful ships of just over a quarter of a century ago may not be out of place here. The Victoria and Sans Pareil of the 1885-6 programme were of 10,470 tons displacement. Their two funnels, disposed athwartships, were exactly half-way between bow and stern; immediately before the funnels was situated the conning tower, from which the ship was fought,

x. **H.M.S SWIFT.** *Cribb, Southsea.*

and immediately before this again was a turret that contained two 16·25in. guns. This turret had an arc of training of 300deg. — 150deg. from right ahead to the 6in. armoured bulkhead against which the gun in the turret eventually came in its traverse from bow to stern. On each beam, beginning where the armoured bulkhead met the armour of the sides, there was placed a battery of 6in. broadside guns, six on either side. At the extreme end of the stern, to compensate for the fact that the guns of the main armament could not fire right astern, was placed a turret in which was a single 18-ton gun. This was a muzzle-loading weapon with a 10in. calibre, firing a projectile weighing 406lb.

In the notation of the guns of this date we still find that the charges for the big guns were made up with prismatic brown powder, prismatic, pebble, and for the smaller guns rifle large grain and large grain. Since the first introduction of gunpowder the warrior who used it either by land or sea had been hampered by the fact that as soon as he discharged his piece such a volume of smoke was liberated that he had to wait until this cleared away until he could see to fire again. At sea, if he were helped by a brisk wind it might get clear away fairly soon, but the direction of the wind was what mattered. If, for instance, in the days of gunpowder a gun was fired with the smoke blowing directly towards the gun, then as soon as the discharge took place the whole of the turret or gundeck would be filled with a white fog of smoke that took several

minutes to disperse. If on the other hand the wind blew from behind the gun, the smoke rolled along in front of it in such a fashion as completely to obscure the object at which aim was being taken. As guns, and in consequence the charges with which they were loaded, increased in size, so also did the volume of smoke increase; and one discharge from a 110-ton gun of a full charge of 900lb. of prismatic brown powder was enough on a calm day to envelop the whole surrounding sea in an impenetrable fog for some minutes.

Before the arrival and adoption of cordite as the recognized explosive in place of powder of different descriptions; before the adoption of many grooved rifling for the bore of the gun, and of the gascheck, which, screwed to the base of the shell, takes the rifling and imparts to the projectile a spinning movement on its longitudinal axis; before the invention of telescopic sights and other aids to marksmanship, the man behind the gun was at a serious disadvantage. He was given a rifled gun it is true, but this weapon consisted of a grooved inner tube, outwardly reinforced by jackets shrunk on, the rifling consisting of grooves—three or more—into which studs projecting from the missile fitted. It is evident therefore that the projectile did not exactly fit the bore, as enough clearance had to be left to allow of its being rammed home. With the modern projectile, the soft-metal gascheck of which fills up the many-grooved tube, when the gun is fired the projectile remains in contact with the bore until it is finally

ejected from the muzzle, and there is in the first place no loss of energy through the escape of the gases past the projectile in its passage along the bore; and, in the second place, in these more scientific days the projectile is absolutely centred at once, and remains on a plumb centre till it leaves the bore.

We have seen that as far back as 1886 there was actually a gun of 16.25in. calibre, also one of 13.5in. It is natural to inquire why these types were not perpetuated, especially as the former was bigger than anything that we possess to-day. The answer to this question is that with the introduction of the new explosive, cordite, and with the new method of gun construction, better results could be obtained from smaller weapons such as the 12in., which superseded the earlier types about 1892.

The gun of the modern Navy as well as the ship has followed a process of evolution, but this process is not so easy to trace. With the ship we observe that she grows bigger and bigger; she is longer, broader; she draws more water; and her tonnage is greater. With the gun it is not the same. For years, for instance, the 12in. gun reigned supreme as the largest ordnance that was mounted in a British warship; and to the outside public, a 12in. was just a 12in. and there was nothing more to be said. This, however, is far from being the case, as we shall proceed to show. The gun has progressed through successive stages, or "marks" as they are technically known. Marks 3, 4, 5, and 5W were "built" guns still firing "prismatic brown" powder; they

were 30 calibres (that is to say 30 feet, the calibre being 12 inches) long, and the weight of the projectile they fired was 714lb. It is necessary also in order to understand the question to mention their "ballistic properties," as they are called. These marks of gun had a muzzle energy of 18,130 foot tons and the penetration of wrought iron at muzzle of gun was 24.4in. Mark 8 of the 12in. is a 35-calibre gun weighing 46 tons, firing a projectile weighing 850lb., having an initial velocity of 2,367 feet per second and developing energy enough to penetrate 11½ inches of Krupp steel at 5,000 yards. Its muzzle energy is 33,020 foot tons. This is a "wire gun" and the charge is 200lb. of cordite. Mark 9 is a 50-ton gun with an enhanced charge of 254lb. of cordite and a penetration of 16 inches of steel at 5,000 yards, while mark 12 is a 50-calibre weapon with a 307lb. charge and a penetration of 19 inches. The weight of projectile in all these later marks remains at 850lb.

The big gun mounted in our latest battleships in commission is the 13.5in., the earlier mark of which throws a projectile of 1,250lb., the later one of 1,400lb. in weight. With further developments, such as the 15in. guns of the Queen Elizabeth class, we are not concerned here, as at the time of writing none of these ships is completed and in commission. It may here be not uninteresting to institute a comparison of fire between England's latest battleships and those of our principal rival on the sea, Germany. Our Iron Dukes are armed with ten 13·5in. guns with a subsidiary anti-torpedo armament of twelve 6in. guns. The weight of metal

that can be discharged by the Iron Duke in one salvo from her heavy guns is 14,000lb., or 6¼ tons. The latest German battleships, the Kaiser class, are armed with ten 12in. 50-calibre guns that discharge a shell of 980lb.; their broadside accordingly is 9,800lb., or 4,200lb. weight less metal than is hurled by the English vessels.

When the atmosphere is sufficiently clear—which is by no means always the case in our far northern waters—the range of these guns is 10,000 yards and over; that is to say that a target can be and is hit at this distance of five sea miles. To do this several things are necessary. The propellant must be of immense power, the gun of extraordinary resisting quality, to take the shock of discharge due to the expansion of gases within it, the sighting must be absolutely accurate, and last, and most important of all, the gunlayer must be an expert among experts, a man of nerve, physique, temperament, and eyesight rarely to be found, and when found to be cherished exceedingly as perhaps one of the most useful servants who serves the State to which we belong; for in the hands of these quiet, clear-eyed, iron-nerved men lie, to a large extent, the destinies of the British Empire. With the growth in size and power of the gun it was found that powder, even in its later manifestation as "prismatic brown," no longer gave satisfactory ballistic results, and in 1891 what was first known as "smokeless powder," and later as "cordite," became the substitute for the time-honoured "villainous saltpetre." It has been laid down that a powder should

produce the maximum of velocity—that is to say velocity imparted to the projectile—with the minimum of pressure. Although it may sound somewhat ridiculous to say so with regard to an explosion, this pressure should start gently; yet to a certain extent this is what has been accomplished by cordite. It is not only necessary that the perfect propellant should begin its work gently, but that having, on first being ignited, overcome the inertia of the projectile without any undue strain on the powder chamber, it should then proceed to expand its gases uniformly all the time that the projectile remains in the bore of the gun, reaching its greatest pressure just as this modern levin bolt is issuing from the muzzle.

Cordite is composed of gun-cotton, nitro-glycerine, and vaseline. Gun-cotton is made by soaking cotton-waste in a mixture of strong nitric and sulphuric acids, nitro-glycerine by acting on glycerine with a similar mixture. By the aid of acetone these ingredients are formed into a jelly which gradually becomes harder as the acetone evaporates, and which, while still plastic, is, with the addition of 5 per cent. of vaseline, forced through holes in a die. The name cordite is given to it on account of the cord-like form in which it is thus obtained. The cord, which is made in diameters ranging from about 1mm. up to 5mm. or more, is dried, cut off in sticks of the length required for the charge, and then made up in silk cartridge bags, or if for use in quick-firing guns loaded into brass cases. There are, of course, many different sorts of these nitro powders.

each nation having its own formula for manufacture. There is, for example, the notorious "Poudre B," until lately used in the French Navy, which caused a series of disastrous explosions in the warships of the great European Republic, culminating in the complete destruction of that fine battleship the Liberté in Toulon Harbour with the loss of hundreds of lives. These explosions were set down to the decomposition of the Poudre B in overheated magazines, the gases liberated becoming in some unexplained way ignited with disastrous results. Since that date all British warships have been fitted with a special cooling apparatus for the magazines, and the magazines themselves are provided with thermometers that are jealously watched to see that a certain uniform temperature is maintained. It may be mentioned that cordite is now used in the manufacture of all cartridges, from those which fire the largest guns afloat down to the rifle cartridge.

The most important of all the projectiles used at sea is necessarily that which is known by the name of "armour piercing." When ships were first built of iron the cast-iron projectile was capable of penetrating the thin armour with which they were provided, but when wrought-iron armour came to be used this was no longer the case. Sir W. Palliser invented a method of hardening the head of the pointed cast-iron shot which need not be here described; suffice it to say that Palliser projectiles proved serviceable against wrought-iron plates, but were ineffective against compound and steel

armour. They were accordingly superseded by projectiles of forged steel. Captain Howard Knox says, in speaking of them :—"At first these forged steel shots were made of ordinary carbon steel, but as armour improved in quality the projectiles followed suit, and for the attack of the latest type of cemented steel armour the projectile is formed of steel—either forged or cast—containing both nickel and chromium. Tungsten has also been used with success. Armour piercing shot or shell are generally cast from a special mixture of chrome steel melted in pots ; they are afterwards forged into shape. The shell is then thoroughly annealed, the core bored, and the exterior turned up in a lathe. The final or tempering treatment is very important, but details are kept strictly secret. It consists in hardening the head of the projectile and tempering it in a special manner, the rear portion being reduced in hardness so as to render it tough. The cavity of these projectiles is capable of receiving a small bursting charge of about 2 per cent. of the weight of the complete projectile, and when this is used it is called an armour piercing shell. The shell, whether fused or unfused, will burst on striking a medium thickness of armour. Armour piercing shells, having a bursting charge of about 3 per cent. of the weight of the complete projectile, are now often fitted with a soft steel cap for the perforation of hard steel armour. Even with these improvements the projectile cannot, with a reasonable velocity, be relied on to pierce one calibre in thickness of modern cemented steel armour."

Common shell is for use against earthworks or the unarmoured portions of ships. For the larger classes of guns these projectiles carry an enormous bursting charge, and when filled with melinite, lyddite, or kindred explosives they are known as high explosive shells. They burst into a large number of pieces and are fearfully destructive in their action. The common shell is for destruction of material, whereas the shrapnel, which is filled with bullets, is essentially a man-slaying machine, the explosion of the charge in the base of the shell driving its contents forward in a cone and sweeping a wide area.

The principal training centre for our seamen in the art of gunnery is the wonderful establishment at Portsmouth known as Whale Island; or in official language as "H.M.S. Excellent"—for every officer, seaman, stoker, or marine (who is afloat and not in barracks) must "be on the books" of a ship. The completeness of this establishment may be gauged from the fact that it possesses two battleships as tenders. In these vessels the men are trained in shooting with the largest classes of guns; while there are besides these vessels a number of gunboats for instruction of seamen in the use of the smaller ordnance that is mounted on board ship. The island is also fitted with turrets and batteries, and these, although not mounted on shipboard, represent the last word in progress in the way of naval equipment. To win battles at sea it is necessary to hit, and to hit, and to go on hitting, and nowhere is this so fully recognized as in this great naval university. Here are trained our

gunnery lieutenants who go hence to take charge of the ordnance and all that that implies at the present day in our battleships. Here also the gunners (warrant officers) and the gunlayers for guns big and small toil to achieve the perfection that is demanded of them as a matter of course. Turret and field gun, broadside and quick-firer, small arms, rifle and revolver, all these things are taught and taught until the pupils are letter perfect. When they go off to sea their places are taken by others, the revolutions of the mill are ceaseless, and the product of these activities shows to the world at large that "the strenuous times of peace" are indeed a fitting preparation for the stern realities of war.

CHAPTER VIII.

PERSONNEL, TRAINING AND DISCIPLINE.

THE NAVY THE SENIOR SERVICE—ADMIRALS OF THE FLEET—GRADATIONS OF OFFICERS' RANK—THE ENGINEERING BRANCH—ROYAL MARINE ARTILLERY AND LIGHT INFANTRY—NAVAL RESERVE—NAVAL VOLUNTEER RESERVE—THE MEN OF THE NAVY, THEIR RATINGS—ADMIRAL HORNBY ON TRAINING—COMPARISON WITH GERMAN NAVY—STATIONS OF A SHIP'S COMPANY—MAIN SCHEME OF ORGANIZATION—THE WATCH BILL AND QUARTER BILL.

WHEN the Navy and the Army are employed together the Navy takes the right of the line or heads the column on the march, the regiments, headed by the First Life Guards, following in order of seniority. This privilege is accorded to the Navy because it is the senior service, there having been a disciplined force for use at sea long before there was a standing Army. All reigning monarchs are, by virtue of their office, heads of the fleets and armies of their countries; Great Britain, however, is the only great State that can claim to have a King who is a seaman in fact as well as in name, one,

moreover, who has "gone through the mill" and served in the junior ranks, who has commanded a torpedo-boat and a gunboat as well as larger units of the Fleet. Head of all the *personnel* of the Navy therefore is his Majesty King George V.

At the head of the Navy List there stand the names of three Admirals of the Fleet, and it is well to recollect that this historic designation is that of a real rank. The Admiral of the Fleet corresponds in rank to the Field-Marshal in the Army; he is seldom employed afloat after he reaches this dignified position. A few years back Admiral of the Fleet Sir Edward Seymour hoisted his flag on board a battle-cruiser and proceeded on a voyage of ceremony to the United States; this is the only occasion of late years on which an officer of this rank has been employed afloat. The Admiral of the Fleet, when he is in command afloat, flies as his flag the Union at the main. Next on the list come the Admirals, at present twelve in number, many of whom hold important appointments. From this list are drawn the Commanders-in-Chief at Portsmouth, Plymouth, and the Nore, the First Sea Lord of the Admiralty, the First and Principal Naval Aide-de-Camp to the King, if not an Admiral of the Fleet, and many other holders of the higher appointments afloat and ashore, although some of these latter are occasionally held by vice-admirals. There are 22 vice-admirals and 58 rear-admirals. All of these officers cannot be employed, but according to the "Navy List" for September, 1914, there were 12 vice-

admirals, including Sir John Jellicoe, who holds the acting rank of admiral, and thirty-one rear-admirals variously employed at home and abroad. The immense increase of the size of the Navy, owing to pressure from Germany, has caused more employment for flag officers of late years than has been the case for a hundred years. The rank corresponding in the Army to admiral is that of general, to vice-admiral that of lieutenant-general, and rear-admiral that of major-general.

The next rank in the Navy is that of captain. Ever since the days of the old French wars these officers have been known, unofficially, as "post captains," but the term has never been employed in the "Navy List" or any other official publication. There are some 297 captains now on the active list. Their duty is to command his Majesty's ships and occasionally to command a small squadron when no admiral is present. The commander is an officer who may either be in command of one of the smaller units of the Fleet, or may be serving in a big ship as second in command under a captain. This latter duty is probably one of the most onerous that falls to the lot of any servant of the Crown. The work of the commander of a big ship begins at 5 a.m. and ends, if he has any luck, at 9 p.m. All organization is in his hands, and although he has many able assistants, still the burden and heat of the day are his, that unending task of keeping his ship fit for battle at any moment of night or day. Quite recently the Admiralty have invented a new rank, that of lieutenant-commander, a rank to which lieutenants are

automatically advanced on reaching eight years' seniority as lieutenants. Next again come the lieutenants, who are often referred to as "the backbone of the service," and after them come sub-lieutenants and mates, these last being promoted from the lower deck; then come the warrant officers who hold executive rank, the midshipmen, and the naval cadets. With these the list of the executive is complete.

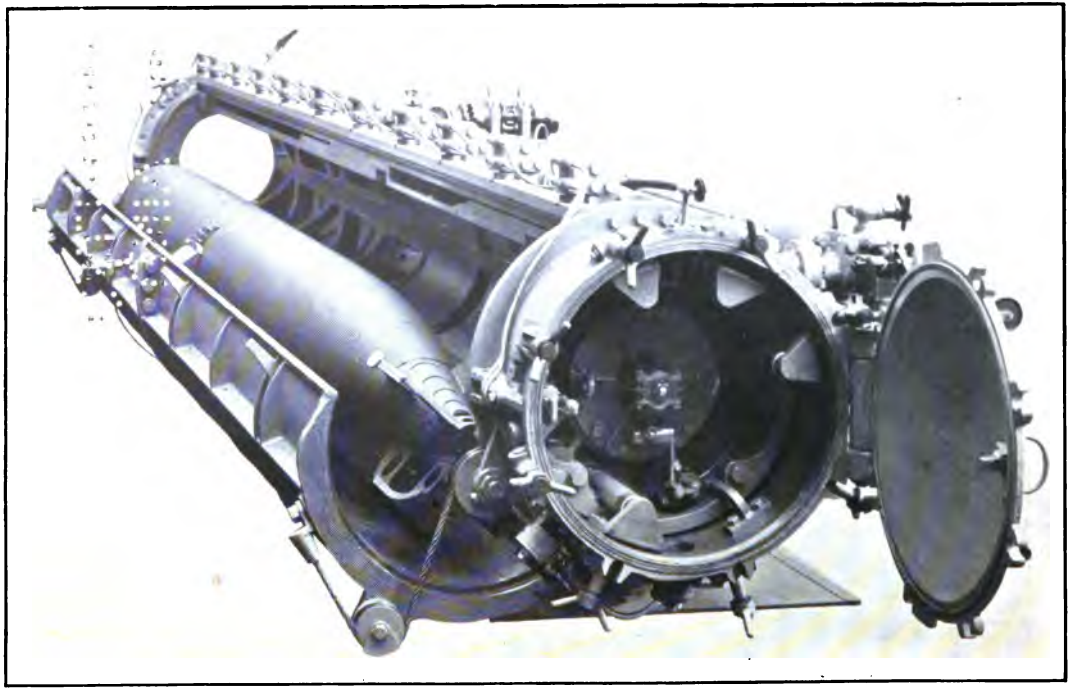
The engineering branch, quite as important as the executive in these days, has a total number of officers of 1,590. The medical branch has 535 officers, and the accountant branch has 776. Chaplains and naval instructors, who teach the midshipmen and cadets, are 165 in number. Of warrant officers, there are over 2,000 of widely diversified types, beginning with our old friends the gunner, the boatswain, and the carpenter, and ending with warrant electricians, head stewards, and instructors in cookery. The Royal Marine Forces, consisting of the Royal Marine Artillery and the Royal Marine Light Infantry, are stationed at Chatham, Portsmouth, and Plymouth, and the Light Infantry have a depôt at Deal. The total number of officers for both corps is just over 500. Detachments from their forces are detailed for service in every ship in commission. The Royal Naval Reserve consists of some 1,350 captains and commanders, lieutenants, sub-lieutenants, and midshipmen, some 300 engineers of various ranks, and some 180 paymasters, all exclusive of numerous temporary appointments recently made. In London, in Bristol, and in Sussex, on the

Tyne and on the Mersey are the headquarters of the Royal Naval Volunteer Reserve, a large portion of which is now mobilized, some of the officers and men being actually afloat, while others are in training on shore for amphibious service as occasion may require,

The men of the Royal Navy are distinguished from one another as follows. There is first the military branch; which consists altogether of 15 ratings, beginning with the second class boy and ending with the chief petty officer. Next comes the engineer branch, of 11 different ratings; these begin with the stoker second class and end with the chief engine-room artificer, who is a chief petty officer. Next is the artisan branch, with 16 different ratings, carpenters, plumbers, joiners, shipwrights, blacksmiths, painters, coopers, armourers, electricians, and so forth. Then, apart from officers, come the medical branch, with four ratings, and the accountant branch, with 16 ratings, such as writers, ships' stewards and their assistants, cooks' mates, cooks, &c. The ship's police, the master-at-arms, and the ship's corporal come next, and then officers' cooks and stewards, shoemakers, tailors, naval schoolmasters, seedies and tindals of seedies, head krooman and kroomen. It may be explained that seedie boys, as they are known in the Navy, are East Coast of Africa negroes, and kroomen are West Coast of Africa negroes. These men are shipped on the West Coast and the East Indian stations to do the work in the sun that it would be dangerous to put a white man to perform, and "the tindal of seedies" is the negro petty officer. These ratings, both kroomen and seedies,

are, as a rule, most excellent, willing workers, who give no trouble to anybody.

Having passed in review the different classes of officers and men, we must next consider the means and methods whereby these individuals are welded into that homogeneous whole which goes by the name of a ship's company. The two essentials are, of course, training and discipline. The abolition of masts and yards on board a man-of-war had one most serious effect, which was that it did away at a stroke with one of the finest forms of physical training. To begin with, there was in this training nothing mechanical; in every evolution performed aloft there was a definite object, and *all* the evolutions were performed in quick time under the stimulus of competition. Even supposing that when you went to drill aloft there was no other ship in company against which to compete, there was always the stimulus of working one mast against another. The perpetual racing up aloft, the never-ending hauling on ropes to keep them taut, even when no drill was in progress, kept the men in hard condition, and stimulated their mental faculties at the same time. The Navy deals harshly with excuses, and the man who does not think rightly at the right time neither expects nor gets much mercy. Discipline and smartness of every sort being so intimately bound up together, it has been a great handicap for the modern officer to have to substitute mechanical exercise for the drill that kept men fit and interested at the same time. In a fighting service discipline is a chain in which there



xi. **ELSWICK 21-INCH SIDE LOADING SUBMERGED TORPEDO TUBE.**
[Sir W. J. Armstrong, Whitworth & Co.

can be no weak links; all must ring true when tested, from the one that binds the admiral in command of a fleet with his captains to that which unites the petty officer with the seaman, the stoker, and the boy. With the brief exception of such shore leave as is enjoyed by officers and men, the Navy is always on duty, the tension is never relaxed. As soon as a ship is commissioned the process begins of welding the ship's company into one homogeneous whole; the strenuous and unceasing endeavour to make the ship a perfect unit in the fighting line and to render her worthy in the day of battle is the one preoccupation of all on board. There are some exceptional men whose reputation lives after them, whose opinions are as valuable after the lapse of years as at the time they were expressed. One of these, undoubtedly, was the late Admiral Sir Geoffrey Hornby, who in his day was unequalled as a trainer of seamen. Writing in 1893 he thus expressed himself:— "The war of 1870 showed that, under able officers, recruits might be converted into thoroughly trained soldiers in three years. We have no precedent to show us that a thorough seaman can be made in double the time. We know that in the most improving school, that of sails, seven years were requisite to make one; and I would advocate no shorter term. We should not only be wrong but foolish if we entered on so large a business without giving the officers who will have to carry it out every assistance that nature, analogy, or precedent can suggest. We must seek out possible pitfalls, direct or obscure, with a view to their avoidance."

What this eminent officer laid down twenty-one years ago is as true to-day as it ever was; and the principle of entering boys for the Navy and training them up into long-service seamen is still upheld by the Admiralty. It is not discipline alone, neither is it drill alone, that makes of men complete sailors. When in the fourth decade of the sixteenth century Soliman the Magnificent, the Ottoman Sultan, sought, and sought vainly, for a man to command his fleet, that he might make head against his Christian foes at sea, his Vizier Ibrahim wrote to him and said: "Rest content for I have laid my hands on a veritable man of the sea." This was none other than Kheyr-ed-Din Barbarossa, the Moslem corsair, the man who contended on equal terms with the Emperor Charles V. at sea, who at the battle of Prevesa in 1538 saw the stern lights of the flagship of Andrea Doria, greatest of Christian admirals in the Mediterranean, disappearing in flight over the horizon when that stark day was done. The quality of the great pirate, the man who was at one and the same time corsair, admiral, and king, lay in the fact that he and those who served with him were—as they were described by Ibrahim—"veritable men of the sea." The habit of the sea is a thing altogether indefinable a thing that cannot be set down in words; all the same it is that habit which has made of the seamen of England what they have been in the past, what, we are proud to think, they remain in the present.

In other nations, with the exception of the United States of America, the seamen who man the ships are

recruited by some form of conscription. The French have what is known as "l'Inscription Maritime," which in the case of the great European Republic puts men on board their warships who have been bred to the sea; she is not dependent on the land conscript. It is otherwise in Germany, where a "Berufspersonal" of about one-third of the whole total of officers and men is engaged year in and year out in getting the best possible results out of conscripts who are drafted to the sea service of the Empire. That it succeeds as well as it does in the training it imparts to the men shows the whole-hearted devotion which the Berufspersonal throws into a task that must be in the highest degree thankless and disagreeable. The most suitable men that the Empire can call upon are thus described by Captain von Kühlwetter, in an article which he contributed in 1913 to the *Naval Annual*:—"Seamen by calling; sea, coast, and harbour fishermen who have carried on their business for at least one year; men who have served one year in the engine room of river steamers. The callings of the country population that are considered most useful are watermen, ferrymen, and raftsmen; and for the engine room, firemen, stokers, and metal workers generally." It is obvious that these different trades must soon be used up and the landsman pure and simple be utilized to fill up the ships' companies.

Organization on board a man-of-war, of whatever size, is the breath of her life. Every man and every officer has assigned to him a station for every evolution that is performed; and for this purpose what is known

as a Watch Bill is used. In the days, not so very far remote be it remembered, when masts and sails still lingered, the ship's company was divided into forecastle men, foretop men, maintop men, mizzentop men, and quarterdeck men. This division corresponded with the part of the ship which the men worked when going aloft with the exception of the quarterdeck men, who in old days went by the name of the afterguard, and whose work was entirely on deck. The ship's company was and is divided into two watches, who take the spell of watch on deck and watch below alternately. That is to say, this is the practice in time of peace. It has been anticipated that in time of war this division of labour might bring too severe a strain on the men, and accordingly they are now organized in some cases in three watches. For the sake of convenience and example we will assume the ship's company to be divided into two watches, port and starboard, and into four "parts of the ship," namely, forecastle, foretop, maintop, and quarterdeck—the foretop and the maintop have gone never to return, but the old names remain—while each part of the ship is further subdivided into two parts—"first" and "second." We then come to what is known as the Quarter Bill, or the actual fighting stations of the men. The four parts of the ship are framed on the quarter bill thus: fore turret, fore turret magazine and shell-room are to be worked by forecastle men; six-inch guns and their magazines and shell-rooms by topmen of side or marines; the after turret, after turret magazines and shell-rooms by

quarterdeck men, torpedo tubes and other magazines being allotted so as to make up any part of the ship to necessary strength. In ships with turrets amidships their guns and magazines are worked by topmen; the remainder of the guns fore and aft by forecastle men and quarterdeck men. By the above method of dividing up the ship's company each part of the ship will form a small-arm company and a division under its own officer. Thus, forecastle men will form A company and first division, foretop men B company and second division, and so on. It will be seen by this arrangement that officers and men remain together; the same lieutenant will command a turret, a company with small arms, and what is known as his division. He has the care of these men, instructs them, sees to their well-being, and recommends them for advancement as opportunity occurs. In smaller classes of ships—we have been speaking so far of the larger units of the Fleet—two parts of the ship combined will form a company, division, and so forth; and in still smaller ships all four parts of the ship combined will form a company, and so forth.

In the watch bill and quarter bill will be found provision for noting down the station of every officer and every man for all drills, evolutions, and emergencies. Thus, in "officers' stations" we find headings for watch, division, open list, day and night action, clearing for action, landing party, net exercise, man and arm boats, abandon ship, fire stations, collision stations, out bower or sheet anchor, anchoring station, and

coaling ship. In the quarter bill are told off the crews for turrets, broadside guns, ammunition supply, torpedo tubes, searchlight crews, control positions, transmitting stations, recording party, night defence control, navigating party, action parties, such as fire brigade, the distribution of rifles to companies, the names of company supernumeraries, and the composition of the field guns' crews. These things that have been enumerated form the main scheme of organization; beyond this there is the subdividing of different parties, such, for instance, as the magazine men. So many men are told off for each magazine; these, again, are divided up into men inside the magazine, men in what are known as the handing rooms, and supply parties. There are besides the telling off of the boats' crews, the apportionment of small arms, and other subsidiary affairs to which to attend.

CHAPTER IX.

THE ORGANIZATION & EXERCISES OF FLEETS.

WHAT A FLEET IS—ITS VARIOUS ORDERS AND FORMATIONS—ORGANIZATION OF A FLEET—STATION KEEPING BY DAY, BY NIGHT, AND IN A FOG—TACTICAL EXERCISES, WITH AN EXAMPLE—MOBILITY AND FLEXIBILITY OF A FLEET.

A FLEET is not a mere casual assemblage of ships without definite disposition. It is a living and moving organism. All fleets, whether composed of battleships alone, of battleships and cruisers, or of battleships, cruisers, and small craft combined, are disposed at all times in some definite and prescribed order, and this order is maintained until at the discretion of the admiral in command some different order is prescribed and assumed. A fleet anchors in a definite formation, it puts to sea in a definite formation, while at sea it cruises in a definite formation, and one of its most frequent exercises at sea is that of changing from formation to formation. In a well-found and well-trained fleet this is done in rapid succession and with amazing precision. To a landsman

afloat there is perhaps no more impressive spectacle to be witnessed on the seas than that of a large fleet engaged in what are known as tactical exercises. The huge ships might well seem to be involved in the mazes of an intricate dance, and the precision of their movements would do no discredit to a well-trained company of dancers. But there is this difference. If the dancers jostle each other no great harm is done, though the symmetry of the dance may be disturbed. If the ships jostle each other hundreds, nay, thousands, of lives and millions of pounds may be lost in a few moments.

The variety of orders and formations in which a fleet may be disposed is very great, and the tactical methods by which any one formation may be converted into any other are far too complicated for detailed exposition here. But one or two examples may be given by way of illustration. We will suppose that the fleet to be considered consists of two battle squadrons of eight capital ships each and two cruiser squadrons of four ships each, light cruisers and torpedo craft being omitted for the sake of simplicity. If such a fleet is at anchor it will probably be disposed in several lines or divisions, the lines being parallel and disposed according to circumstances at so many cables—or multiples of 200 yards—apart, and the intervals between any one ship in any line and its next ahead or its next astern being also prescribed as so many cables. Thus a plan or chart of the anchorage with the ships as stationed would show them all disposed in a strictly symmetrical order.

Now let us suppose that such a fleet so disposed receives orders to weigh anchor and go to sea. We will also suppose that the exit from the anchorage is so narrow that the ships must go out one by one. It should be premised that when the fleet was first assembled it was told off by the admiral in command in one or more "organizations," the details of these several organizations being reduced to writing and distributed to all the ships affected. Only one hypothetical organization need, however, here be considered. As the fleet includes two battle squadrons of eight ships, each of these two squadrons would be constituted a "division" with a flag officer in command, and organized in two equal subdivisions, the second subdivision being under the command of a junior flag officer. The cruiser squadrons, each under a flag officer, would be similarly organized. Other organizations suitable to special circumstances or occasions might also be prescribed, but these need not be considered in detail. It suffices to say that the transition from one organization to another can be effected at any moment at the discretion of the Commander-in-Chief by the display of suitable signals from his flagship. On being ordered to sea the ships will weigh anchor together, and when all have reported themselves "ready to proceed" the signal will be made to the first division to get under way at so many knots speed and proceed to sea. The same signal will in due course be made to each of the other divisions, and the result of the whole evolution will be that the ships when clear of the anchorage will be disposed in what

is known as "single line ahead," that is, a straight line in which the ships are at equal intervals one from another. This is at once the simplest and most flexible formation in which warships can be disposed at sea; but owing to its length when a fleet is composed of a large number of units it is not the most convenient formation for cruising purposes. Hence, as soon as he has got his fleet to sea the admiral will probably want to dispose it in some more convenient formation. A common formation would be for the two battle squadrons to be disposed abeam of each other at a distance apart equal to their own length, in line with one of the cruiser squadrons equi-distant from the two at a prescribed distance ahead and another similarly disposed astern.

It will be asked how these prescribed distances can be maintained as they are with amazing precision in a well-ordered fleet. Of course, as the ships are all proceeding at equal speed it might be thought that their relative positions once established would be automatically maintained. But the first problem is to establish them. How is a ship to know when she is at the prescribed distance from her next ahead or her next astern in the line, and how is a cruiser squadron to know when it is at the prescribed distance, often several miles, ahead or astern of the battle-fleet? This is done by means of the sextant. The height from masthead to waterline of any ship is a constant quantity, and it subtends a constant angle at any given distance. This angle can be accurately measured by a sextant. Each ship in the fleet is furnished with a table of "masthead

angles," as they are called, of all the ships in company for all such distances as are likely to be required for the purposes of "station keeping." By the observation of the masthead angle of the ship at the head of the line a ship can always find her own station in the line, and if by recurring observations of the same angle the ship is found to be forging ahead of her station or dropping astern of it the error is corrected by reducing or increasing the speed of her engines. For this purpose the speed of a warship is measured by the number of revolutions her screws are making per minute. Every ship knows exactly how many revolutions per minute are required to produce a speed of a given number of knots, and this information is tabulated for use and reference, as required, by the officers in charge of the ship. But, of course, the relation between revolutions and knots is apt to be very appreciably affected, and differently affected in different ships, by varying conditions of weather and sea. Hence, although the prescribed number of revolutions for a given speed may be steadily maintained, yet it may easily be that the ship will at one time forge ahead or at another drop astern of her proper station; and when that is found to be the case the number of revolutions is forthwith increased or reduced as may be required. There are other auxiliary agencies whereby the accuracy of station-keeping is very materially promoted. Standing signals are provided, some of them working automatically, others constantly attended by hands told off for the purpose, whereby each ship in the fleet may know exactly what

each of her consorts is doing as regards the speed she is making and the helm she is carrying at any given moment. But these are only refinements conducive to extreme precision and not necessary to it. An expert station keeper will dispense with them all if need be and keep station by keenness of eye and that instant readiness of judgment which long experience renders almost instinctive. But he cannot wholly dispense with the observation of masthead angles by means of the sextant.

Even this, however, is not available at night or in a fog. How, then is station kept or are changes of formation effected in these conditions? At night it is done by means of suitable signals, either visual in the form of lamps which can be displayed or extinguished in an endless variety of signification, or audible made by means of long and short blasts on the steam siren by which orders and indications can be conveyed in the Morse code. In fog each ship tows a buoy astern, the length of the hawser to which the buoy is attached being equal to the prescribed distance between the towing ship and her next astern. If the ships are duly alined each ship will know that she is keeping proper station so long as she can see the buoy towed by her next ahead immediately in front of her bows. Of course station keeping at night or in a fog can never be quite so accurate as it is in daylight and in clear weather, and changes of formation are more sparingly prescribed at night or in fog; but they are never shirked when occasion requires.

Let us now return to the fleet which we left at sea

in a cruising formation. We will suppose that the Commander-in-Chief decides to engage in tactical exercises with his battle fleet. For this purpose he will probably dispose his cruiser divisions at a suitable distance so as not to get in the way of his battleships, and perhaps direct them to engage in independent tactical exercises under the command of the senior flag officer. This being done the dance will begin. We call it a dance because, although the dancers may be huge vessels displacing 20,000 tons or more, there is no metaphor better fitted to express the ease, grace, flexibility, intricacy, and precision of their movements. For the next few hours the battle fleet will remain in no one formation for any longer time than it takes the admiral to decide on another and to make the signal which prescribes its assumption. We have assumed that the formation is line ahead in two divisions. The admiral desires to change it into single line ahead and makes the signal provided for that purpose. Instantly every ship acknowledges the signal by hoisting a flag known as the "answering pendant." But this pendant is at first hoisted "at the dip," as it is called, that is, not close up to the masthead or yardarm, as the case may be, to indicate that the signal has been observed. After the few moments required to enable the captain to be sure that he has rightly understood the signal made by the admiral the answering pendant is hoisted "close up." When all the ships have so answered the flagship's signal is hauled down, this being the executive order for the evolution to begin. Instantly

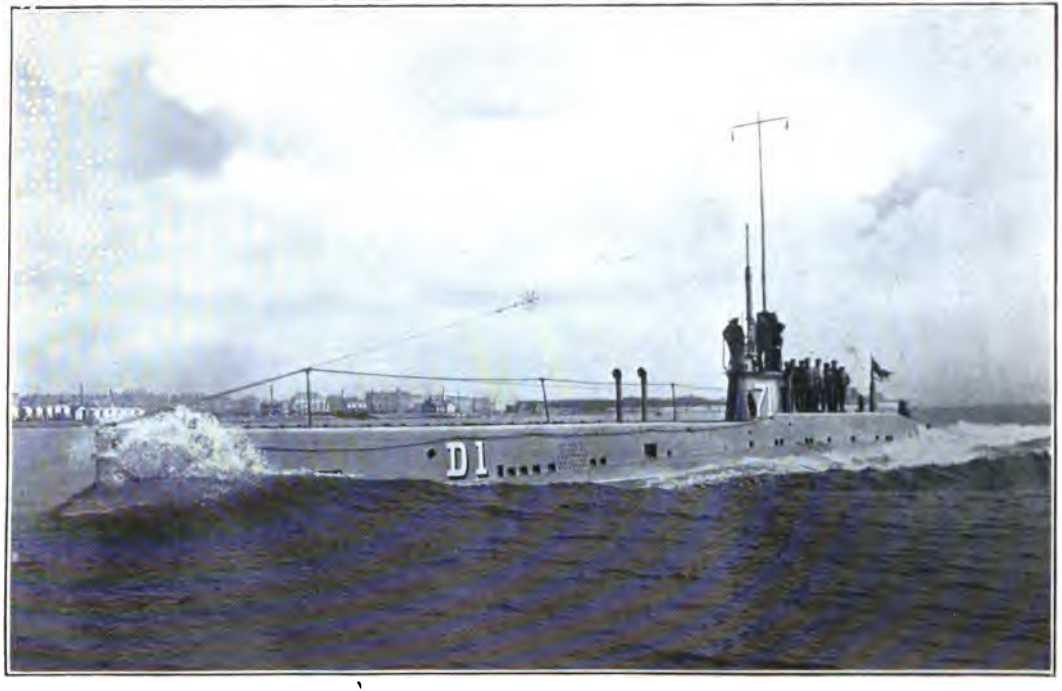
the ships in the second division put over their helms simultaneously so as to turn together through a right angle and steer on parallel courses, in temporary "line abreast," as it is called, towards the rear of the first division, which maintains its course and speed. On nearing that position the helms are again altered so as to resume the line ahead, when, if the evolution has been rightly performed, the second division will be disposed astern of the first in line ahead and each of its ships will be in its proper station.

We have analysed this evolution—one of the simplest that a fleet can undertake—at some length because it is the only example which our space allows us to give of what are known as tactical exercises. It must suffice to say that there is no formation which a fleet can assume either for cruising purposes or for the purpose of engaging the enemy to the best advantage—which is, of course, the paramount purpose of all—or for the purpose of improving its own flexibility and mobility, which an admiral will not call upon his fleet to assume in the course of a few days' exercises at sea. He will do this, not once or twice, but over and over again, and he will do it at high speed, seldom less than 12 knots and often a good deal more. In war time he has the advantage over his comrades in an army that he has no line of communications to guard, for he carries all his supplies with him except coal, and that he knows where and how to obtain; and once in the open sea he can move just as easily and just as quickly in any one direction as in any other, for he furnishes his own

transport and the men under his command need never undertake a longer march than from one end of the ship to the other. If he desires to detach a portion of his fleet for any purpose the thing is done almost as soon as thought of. Detailed instructions are sent to the senior officer of the detachment, a few flags are tossed out from the flagship's bridge, and away goes the detachment self-contained and self-supplied. At the end of 24 hours the parent fleet and its detachment may easily be over 700 miles apart.

In the whole art of warfare there is nothing more impressive than this almost uncanny flexibility and mobility of a fleet as compared with an army. Raleigh understood the secret of a fleet's mobility even in his day. "Les Armées ne volent point en poste," he wrote in his "History of the World," "Armies neither flye nor run post, saith a Marshal of France. And I know it to be true, that a fleet of ships may be seen at sunset, and after it at the *Lisard*; yet by the next morning they may recover *Portland*, whereas an Army of foot shall not be able to march it in six dayes." If this was true in Raleigh's days it is far more true now when ships can move at much greater speed and never have to wait for a wind. But although the mobility of a fleet may in large measure be inherent in itself, yet its flexibility is by no means a thing which comes by nature, It comes only by sustained training and by the zeal. skill, and intelligence with which that training is imparted and assimilated. "Nautical skill," as Pericles told the Athenians, "is no haphazard

thing to be acquired at odd moments. You must give your whole time and mind to it if you are to excel in it." That is a lesson which the King's Navy learnt long ago.



xii. **SUBMARINE D I.** [*L. N. A.*

xiii. **SUBMARINES E 4 AND E 9.** [*W. H. Holloway.*

CHAPTER X.

HOW THE NAVY IS GOVERNED.

THE ADMIRALTY—ITS ANTIQUITY, CONSTITUTION, AND HISTORY—THE PATENTS—THE LORD HIGH ADMIRAL—FLEXIBILITY THE NOTE OF ADMIRALTY ADMINISTRATION—THE NAVY BOARD AND ITS SUPPRESSION—THE FIRST LORD—THE SEA LORDS—PRESENT CONSTITUTION OF THE BOARD—DISTRIBUTION OF BUSINESS—THE WAR STAFF.

THE Navy, as every one knows, is ruled by the Admiralty, and the Admiralty is one of the oldest organs of administration in this country. It is also quite unique in its constitution and characteristics. There is nothing exactly like it in any of the other public departments of the State. The War Office has of late years been more or less assimilated to it, but the resemblance between the two is superficial, while the differences are many and organic. The Admiralty, indeed, has no fixed constitution. There are certain documents which seem to define its duties, functions, and responsibilities, but the inner spirit of its working is not to be found in them. That is embodied in a whole mass of usages, precedents, prescriptions, and informal understandings, many of which have come

down from time immemorial, none of which possesses the fixity of a constitutional text, while all are endowed with a flexibility which enables them to conform without stress or friction to circumstances as they arise in any emergency. Sir James Graham, a former First Lord of the Admiralty, who had closely studied its constitution and who himself took a leading part in one of its most memorable reorganizations, declared in 1861 to a Committee of the House of Commons, "The more I have investigated the matter the more I am satisfied that, like the common law in aid of the Statute Law, the power exercised by the Board of Admiralty and the different members of it rests more upon usage than upon the Patents, uninterrupted usage from a very early period."

Mention is here made of "the Patents." Each successive Board of Admiralty derives its formal authority from a Patent issued by the Crown, a new Patent being required whenever any change is made in the *personnel* of the Board. But these successive Patents are, and have been for more than two centuries, issued in substantially the same form. The Patent issued by Queen Anne vesting in Commissioners —now officially known as "My Lords Commissioners of the Admiralty"—all the powers previously exercised by her husband, Prince George of Denmark, as Lord High Admiral is, save for certain small alterations, omissions, and additions, textually identical with that issued to the present Board of Admiralty by King George V. From it is nominally derived all the authority exercised

by the Board of Admiralty over the whole naval service and over the civil departments subject to its control, though in reality much of that authority is of much earlier origin and date. The Patent of Queen Anne is only one of a long series, though it derives its special importance, on the one hand, from the fact that it marks a break in that series, and on the other from the fact that it has survived to our own days. The essential thing to bear in mind is that the Board of Admiralty as we know it is a body of Commissioners appointed by the Crown to execute the office of Lord High Admiral. Now the office of Lord High Admiral goes back to the beginning of the fifteenth century, its incumbent receiving a Patent of office just as the Board of Admiralty receives a similar Patent to-day. The powers conferred on successive Lords High Admiral varied from time to time and were gradually enlarged. As early as the reign of Henry VI. the Patent had received a form and scope not greatly differing from those of the Patent issued by Queen Anne and her successors. We need not, however, trace the office of Lord High Admiral through its expansion in the time of Henry VIII. into an Office of Admiralty on the one hand and a Navy Board on the other, or through its vicissitudes in Stuart and Commonwealth times down to its final abeyance on the death of Prince George of Denmark. It was, it is true, revived for a short period early in last century in favour of the Duke of Clarence, afterwards King William IV., but the revival proved so disastrous to the welfare and good government of the Navy that it soon came to an end.

and for all practical purposes it may be said that the office of Lord High Admiral has been in commission since Prince George of Denmark died in 1709. But its spirit survives not merely in the Patent of Queen Anne but in an earlier declaratory Act passed in 1690 under William and Mary to define the powers of a Board of Admiralty appointed at a time when the office of Lord High Admiral was in temporary abeyance. That Statute recited that "all and singular authorities, jurisdictions and powers which, by Act of Parliament or otherwise," had been lawfully vested in the Lord High Admiral of England, had always appertained and should appertain to the Commissioners for executing the office for the time being "to all intents and purposes as if the said Commissioners were Lord High Admiral of England." Whatever, therefore, the Lord High Admiral, in the height and plenitude of his power, might lawfully do, that the Board of Admiralty may also lawfully do. Its power and authority extend far beyond the Patent and the Statute of William and Mary because both those instruments confirm the powers of the Lord High Admiral without attempting to define them.

We have dwelt upon this peculiar history because it affords an instructive insight into those inestimable qualities of flexibility of administration and ready adaptability to circumstances which have made the Admiralty what it is. We have seen that both an Office of Admiralty—constituting as it were the Staff of the Lord High Admiral—and a Navy Board existed as early as the reign of Henry VIII. The latter administered

the civil departments connected with the Navy in greater or less subordination to the former, which in its turn performed many of the directive and executive duties pertaining to the Lord High Admiral himself. This was no very logical distribution of the administrative work to be done, and those who are familiar with the history of naval administration in the eighteenth century are well aware that there was constant friction between the Navy Board and the Admiralty and that the former became in the course of time a very hotbed of inefficiency and even corruption—vices, however, from which the Admiralty itself was not entirely free. Still, the system survived through the great wars of the eighteenth and early nineteenth centuries and provided a Navy which, thanks mainly to the zeal and devotion of the officers who served in it, was generally equal to the work it had to do. It was abolished in 1832, when Sir James Graham in a series of far-reaching reforms put an end to what was regarded as a mischievous dual control. The Navy Board, always subordinate to the Admiralty, was then finally incorporated with the latter. The effect of this reform has been variously estimated by different authorities. It is held by many that the organization and direction of the naval forces of the country, their training in time of peace, and their disposition to the best advantage in war, are functions which require qualities and habits of mind fundamentally different from those which are needed for the design, construction, and supply of *matériel*; and further that, in an age of rapid material

evolution, if those who are responsible for the higher direction and disposition of our naval forces afloat are also to be made responsible for the design, construction, equipment, and supply of the warships required, the latter preoccupation must needs tend to overshadow and attenuate the former, which is nevertheless by far the more important of the two. But if the Admiralty is judged by its fruits, this contention, however cogent in the abstract, would seem to be largely disallowed.

We must pass over the various forms which the Board of Admiralty has assumed since the Patent of Queen Anne finally settled such written constitution as it has, and come at once to its structure and organization at the present day. The pivot and centre of the whole is the First Lord of the Admiralty. In the eighteenth century it was not uncommon for a naval officer of high rank and repute, such as Anson, Hawke, St. Vincent, Barham, and others, to hold the office of First Lord. But in more modern times the First Lord of the Admiralty has always been a civilian, and a politician with a seat in the Cabinet. The professional element so necessary to the government and control of a great fighting service is to be found in the naval members of the Board—Sea Lords as they are officially designated—and not in the statesman who presides over them. The powers, functions, and responsibilities of the First Lord have never been very precisely determined. He is not a Lord High Admiral, since he is only the chief of a body of Commissioners for executing the office of that functionary, and the powers conferred

by the Patent are conferred not on any individual but on "any two or more of you." Nor can he as a Minister representing his Department in the Cabinet and in Parliament act wholly independently of his colleagues on the Board. Theoretically he could, perhaps, and there may in past times have been a few exceptional cases in which a First Lord has so acted. But in these days a First Lord who took important decisions in opposition to the judgment of his professional colleagues would very soon find his position untenable. As a rule, then, the First Lord is the intermediary between the Cabinet and the Board, and the representative of his Department in Parliament, deriving immense authority and influence from the fact that—under the Cabinet which can always overrule him—he is directly responsible to Parliament and the country for the efficiency and sufficiency of the Fleet, the other members of the Board being in like manner directly responsible to him. The unwritten usages of the Admiralty and the happy elasticity of its constitution render all questions of ultimate prerogative such as the one just glanced at merely academic and even otiose. Wherever two Lords and a Secretary are gathered together there a decision can be taken. This wise prescription of the Patent enables prompt action to be taken independently of time and place and almost of persons. Board meetings have been held at Malta and, it may be, far away at sea.

The Board of Admiralty as now constituted consists of the First Lord, who presides over it, of the First, Second, Third, and Fourth Sea Lords, of the Civil Lord,

of the additional Civil Lord—who holds an office which formerly existed for a short time and was revived for special purposes by Mr. Churchill in January, 1912—of the Parliamentary Secretary, and of the Permanent Secretary. The whole of the business of the Admiralty is distributed among these several members of the Board according to a standing scheme known as the "Distribution of Business." This scheme is modified from time to time and revised according to circumstances, but as it stands for the time being it clearly defines the sphere of administration for which each member of the Board is responsible. Thus, according to the scheme at present in force, the First Lord is responsible for the "general direction of all business"—a comprehensive range of responsibility which of itself invests the First Lord with a large measure of authority over each and all of his colleagues. The First Sea Lord is responsible for "organization for war and distribution of the Fleet" and for all executive and administrative questions relating thereto. In particular he is charged with the supervision of the War Staff, about which we shall have more to say hereafter. The Second Sea Lord is responsible for all questions relating to "*Personnel*" and the Third Sea Lord for all questions relating to "*Matériel*." The Fourth Sea Lord is responsible for all questions relating to "Stores and Transport." The Civil Lord is responsible for all questions relating to "Works, Buildings, and Greenwich Hospital," and the Additional Civil Lord for all questions relating to "Contracts and Dockyard Business." The Parlia-

mentary Secretary is at the head of the department of "Finance" and the Permanent Secretary superintends all "Admiralty Business." He controls the internal administration of the Department, and all communications from "My Lords Commissioners of the Admiralty" pass through his office and are signed by him.

It will be seen that the spheres of administration thus assigned to the several members of the Board are very comprehensive in scope. We have only given their short titles as set forth in the "Distribution of Business" and not their detailed specification, which is also to be found in that document. Moreover, the several spheres are manifestly not autonomous, independent, and self-contained. They overlap and intersect each other at almost innumerable points. But the Admiralty does not work in water-tight compartments. When questions arise which concern two or more branches of the common administration the heads of those branches or their authorized representatives will meet informally for their discussion. Larger questions will be dealt with by the Board itself assembled in its historic Board Room under the presidency of the First Lord.

Thus all the master threads of a vast network of administration, affecting every branch of naval policy, naval preparation, naval construction, and naval finance, pass in due order into the Board Room, thence, after due deliberation and decision, to issue in the form of executive orders and directions. This is the paramount function of the Board, a function which immemorial usage and that flexibility of adaptation which

is native to the sea service enable it to discharge with rare efficiency and, on occasion, with unexampled celerity and dispatch, all Statutes, Patents, and Orders in Council notwithstanding. As Lord George Hamilton, a former First Lord of great experience, told a Royal Commission in 1887, "It has this advantage, that you have all departments represented round a table, and that if it is necessary to take quick action, you can do in a few minutes that which it would take hours under any other system to do."

Lastly, there is one vital organ of naval administration which has already been mentioned above, but which will well repay some further consideration. This is the War Staff. In its present form the War Staff is a newly-constituted department—the country owes it to the initiative of the present First Lord—though its constitutuent elements, imperfectly articulated and co-ordinated, have existed at the Admiralty for many years past. A Foreign Intelligence Branch was first established in 1883. This developed in a few years into the Naval Intelligence Department, its development in that direction having been greatly advanced by that gallant and zealous officer Admiral Lord Charles Beresford, who as Fourth Sea Lord of the Admiralty from 1886 to 1888 strenuously insisted on its vital importance, and is believed to have resigned in the latter year because he could not overcome the apathy of his colleagues on the subject. The Naval Intelligence Department has now in its turn been absorbed into a fully constituted War Staff, of which the best description

is to be found in the following extracts from a Memorandum drawn up by the present First Lord and issued by the Admiralty on January 1, 1912 :—

". . . . Naval war is at once more simple and more intense than war on land. The executive action and control of fleet and squadron commanders is direct and personal in a far stronger degree than that of generals in the field, especially under modern conditions. The art of handling a great fleet on important occasions with deft and sure judgment is the supreme gift of the admiral, and practical seamanship must never be displaced from its position as the first qualification of every sailor. The formation of a War Staff does not mean the setting up of new standards of professional merit or the opening of a road of advancement to a different class of officers. The War Staff is to be the means of preparing and training those officers who arrive, or are likely to arrive by the excellence of their sea service, at stations of high responsibility for dealing with the more extended problems which await them there. It is to be the means of sifting, developing, and applying the results of history and experience, and of preserving them as a general stock of reasoned opinion available as an aid and as a guide for all who are called upon to determine, in peace or war, the naval policy of the country. It is to be a brain far more comprehensive than that of any single man, however gifted and tireless and unceasing in its action, applied continuously to the scientific and speculative study of naval strategy and preparation. It is to be an instrument capable of formulating any decision which has been taken, or may be taken, by the executive, in terms of precise and exhaustive detail.

"It should not be supposed that these functions find no place in Admiralty organization at the present time. On the contrary, during the course of years, all or nearly all the elements of a War Staff at the Admiralty

have been successively evolved in the practical working of every-day affairs, and have been developing since the organization of the Foreign Intelligence Branch in 1883. The time has now come to combine these elements into an harmonious and effective organization, to invest that new body with a significance and influence it has not hitherto possessed, and to place it in its proper relation to existing power.

"The government of the Navy has by long usage been exercised by the Board of Admiralty representing the office of Lord High Admiral in commission. There is no need to alter this constitution, which has been respected through centuries of naval supremacy by all ranks in the fleets. The War Staff will, like all other persons in the Admiralty or the Navy, be under the general authority of the Board of Admiralty. It will not interpose any barrier between the Board and the Navy. All the orders which emanate from the Board will continue to be transmitted in the regular manner by the Secretary to those whom they concern.

"Each of the Sea Lords on the Board of Admiralty has a special sphere of superintendence assigned to him by the First Lord in pursuance of the Order in Council. The First Sea Lord is charged with preparations for war and the distribution of the Fleet. The Second Sea Lord, who is to be kept in close relation to the First Sea Lord, mans the Fleet and trains the men. The Third Sea Lord directs the military construction of the Fleet; and the Fourth Sea Lord is responsible for furnishing it with adequate and suitable stores and ammunition. All these Heads of large departments will have occasion, in the discharge of their respective duties, to recur to the War Staff or its various branches for general information or for working out special inquiries.

"Since, however, under the distribution of Admiralty business on the Board, the First Sea Lord occupies for certain purposes, especially the daily distribution of the

Fleet, on which the safety of the country depends, the position of a Commander-in-Chief of the Navy, with the First Lord immediately over him, as the delegate of the Crown in exercising supreme executive power, it follows that the War Staff must work at all times directly under the First Sea Lord. His position is different in important respects from that of the senior member of the Army Council as constituted. The First Sea Lord is an executive officer in active control of daily Fleet movements, who requires, like a General in the field, to have at his disposal a Chief of the Staff, but who is not the Chief of the Staff himself.

"A proper staff, whether naval or military, should comprise three main branches—namely, a branch to acquire the information on which action may be taken; a branch to deliberate on the facts so obtained in relation to the policy of the State, and to report thereupon; and, thirdly, a branch to enable the final decision of superior authority to be put into actual effect. The War Staff at the Admiralty will, in pursuance of this principle, be organized from the existing elements in three divisions—the Intelligence Division, the Operations Division, and the Mobilization Division. These may be shortly described as dealing with war information, war plans, and war arrangements respectively. The divisions will be equal in status, and each will be under a director, who will usually be a Captain of standing. The three divisions will be combined together under a Chief of the Staff.

"The Chief of the Staff will be a Flag Officer. He will be primarily responsible to the First Sea Lord, and will work under him as his principal assistant and agent. He will not, however, be the sole channel of communication between the First Sea Lord and the Staff; and the First Lord and the First Sea Lord will, whenever convenient, consult the Directors of the various Divisions or other officers if necessary. This direction is essential to prevent that group of evils which have

always arisen from the "narrow neck of the bottle" system. The Chief of the War Staff will guide and co-ordinate the work of the Staff in all its branches. He will, when desired, accompany the First Lord and the First Sea Lord to the Committee of Imperial Defence.

"Although the methodical treatment of the vast number of subjects to be dealt with by the Staff requires that there should be divisions and subdivisions, yet it is imperative that these should never be permitted to develop into water-tight compartments. It will be found that there is so much overlapping between divisions that a constant, free, and informal intercourse between them is indispensable. To promote this, the Chief of the Staff will be enjoined to hold frequent meetings—to be called 'Staff meetings'—with the heads of the three divisions, and each of the Directors will be kept fully acquainted with the work of their two colleagues. Each one of the Directors will be ready at any moment to act for the Chief of the Staff in the latter's absence from whatever cause. In times of profound peace, action has often to be taken immediately on the receipt of some telegraphic report, or a request from one of the other Departments of State; one of the three Directors will, therefore, always remain within prompt call by messenger night and day.

"The functions of the War Staff will be advisory. The Chief of the Staff, when decision has been taken upon any proposal, will be jointly responsible with the Secretary for the precise form in which the necessary orders to the Fleet are issued, but the Staff will possess no executive authority. It will discharge no administrative duties. Its responsibilities will end with the tendering of advice and with the accuracy of the facts on which that advice is based.

"Decision as to accepting or rejecting the advice of the Staff wholly or in part rests with the First Sea Lord, who, in the name of the Board of Admiralty, discharges the duties assigned to him by the Minister. In the

absence of the First Sea Lord for any cause the Second Sea Lord would act for him. . . .

"The *personnel* of the War Staff must be considerable in numbers, and will consist of naval officers, representing most grades and every specialist branch, fresh from the sea and returning to the sea fairly frequently. Nothing in the constitution of the Staff will be designed to arrest the free play of professional opinion in all its members from top to bottom. Fresh ideas, new suggestions bred by independent study and reflection, may find their proper expression in all ranks. Disciplined cooperation in working out schemes which have been prescribed will not exclude reasoned criticism and original conceptions, the central objects being to form at once a convenient and flexible machine for the elaboration of plans and a school of sound and progressive thought on naval science.

"The selection and training of the officers to compose a Staff of the nature described is important. Hitherto no special qualifications have been regarded as essential for the officers employed in the Intelligence and Mobilization Departments, because the ordinary sea training of naval officers was supposed to supply all that was required. This training, however, although admirable on its practical side, affords no instruction in the broader questions of strategy and policy, which become increasingly important year by year. A change in this respect is therefore considered advisable, and a special course of training at the War College will form an essential part of the new arrangements. The President of the College will be entrusted with this important duty, and in order that it may be carried out to the best effect, he will at all times be in close touch and association with the Chief of the Staff. In course of time the appointment will be held by a Flag Officer who has been a Staff Officer himself. Candidates for the Staff will be selected from volunteers among lieutenants of suitable seniority as well as officers of other branches throughout

the Service irrespective of their previous qualifications as specialist officers or otherwise, and those who pass the necessary examinations at the end of or during the War College course will be eligible to receive appointments either at the Admiralty or on the Staff of Flag Officers afloat as they fall vacant. In all cases, however, regular periods of sea-going executive duty will alternate with the other duties of Staff Officers of all ranks, in order that they may be kept up to the necessary standard as practical sea officers. All appointments on sea-going staffs will in the course of time be filled by these officers, and form the proper avenue to eventual employment in the highest Staff positions at the Admiralty. . . ."

Readers of this memorable document may well be torn asunder by two conflicting emotions—one that of wonder that the War Staff, which is in truth the very brain and soul of the Navy, was so long in coming to the birth; the other that of intense satisfaction that it came to the birth at last in time to render infinite service to the country in the war that is now shaking the world to its foundations.

xiv. **H.M.S. HIGHFLYER.** [*Daily Mirror.*

APPENDIX.

THE SHIPS OF THE BRITISH FLEET.

The following alphabetical lists of the ships in the British Fleet—armoured ships, cruisers, and torpedo craft of all kinds—are founded on those contained in the *Naval Annual* for 1914, and are here reproduced by the kind permission of the editor of that valuable publication. The lists represent the Fleet as it was before the outbreak of war, and it has not been thought necessary to omit the names of those ships which have unfortunately been lost since hostilities began.

The abbreviations used in the lists are as follows :—

a.c.	Armoured cruiser.	H.S.	Harveyized or similar hard-faced steel.
a.g.b.	Armoured gunboat.	K.S.	Krupp steel.
b.	Battleship.	shd.	Sheathed.
b.cr.	Battle cruiser.	P.	Protected.
l.cr.	Light cruiser.	*t.*	Turret-ship (in class column).
c.d.s.	Coast defence ship.	*t.*	Speed and I.H.P. at trial (in speed and I.H.P. columns).
comp.	Compound or steel-faced armour (in armour column).		
cr.	Cruiser.		
A.A.	Anti-air-craft guns.		
d.v.	Despatch vessel.	to-cr.	Torpedo-cruiser.
g.b.	Gunboat.	to.g.b.	Torpedo-gunboat.
g.v.	Gun-vessel.		

l. Light guns under 15cwt., including boats' guns.
M. Machine guns.
sub. Submerged torpedo tube.
A. Armstrong guns. K. Krupp guns.

ARMOURED SHIPS.

Class	NAME.	Displacement.	Indicated Horse-Power.	Date of Completion.	Armour.						Armament.		Speed.	Coal.	Complement.
					Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.			
									Heavy Guns.	Secondary.					
		tons.			in.	in.	in.	in.	in.	in.			knots.	tons.	
a.s.	ABOUKIR shd.	12,000	21,375	1902	6–2 K.S.	3–1½	..	5 K.N.	6 K.S.	5	2 9·2in., 12 6in., 12 12 pr., 3 3pr. 8M., 2 l.	2	21·6 ½	800	755
														1,660	
a.c.	ACHILLES ..	13,550	23,275	1907	6–4–6 K.S.	½–1	6	6	6	6	6 9·2in., 4 7·5in., 24 3pr., 2 M.	3	23·27 ½	1,000	704
b.	AFRICA ..	16,350	18,696	1906	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 12in., 4 9·2in., 10 6in., 12 12pr., 12 3pr., & M.	4	18·95 ½	950	825
														2,150	
b.	AGAMEMNON ..	16,500	17,285	1908	12–6 K.C.	2	8	8	12	7	4 12in., 10 9·2in., 24 12pr., 2 3 pr., & 5 M.	5	18·75 ½	900	865
														2,500	
b.	AJAX	23,000	28,000	1913	12–6	..	9	..	10	..	10 13·5in., 16 4in., 4 3pr.	3	22 ½	900	900
b.	AUDACIOUS ..	23,000	28,700	1913	12–6	..	9	..	10	..	10 13·5in., 16 4in., 4 3pr.	3	22 ½	900	900
b.	ALBEMARLE ..	14,000	18,296	1908	7–6 K.S.	2–1	7	7 K.S.	11 K.S.	6 K.S.	4 12in., 12 6in., 10 12pr., 2 3pr., & M.	4	18·6 ½	900	750
														2,000	
b.	ALBION ..	12,950	18,885	1902	6–2 K.N.	3–1	6	12–6 K.N.	12–6 K.N.	5 K.N.	4 12in., 12 6in., 10 12pr., 6 3pr., & M.	4	17·8 ½	800	700
														2,800	

a.c.	ANTRIM ..	10,850	21,604	1905	6–2 H.N.	2–½	..	4½ H.N.	6 H.N.	6 H.N.	4 7·5in., 6 6in., 20 3pr., 2 M.	2	23·02 f	800	655
														1,950	
a.c.	ARGYLL ..	10,850	21,190	1906	6–2 H.N.	2–½	..	4½ H.N.	6 H.N.	6 H.N.	4 7·5in., 6 6in., 20 3pr., 2 M.	2	22·38 f	800	655
														1,950	
a.c.	BACCHANTE abd	12,000	21,520	1902	6–2 K.S.	3–1½	..	5 H.N.	6 K.S.	5	2 9·2in., 12 6in., 12 12pr., 3 3pr., 8 M., 2l.	2	21·75 f	800	755
														1,600	
b.	BARHAM ..	27,500	30,000	..	13	..	..	..	10	..	8 15in., 12 6in.	..	25	Oil	..
b.	BELLEROPHON	18,600	23,000	1908	11–6–4 K.C.	..	8	..	11 K.C.	..	10 12in., 16 4in., 4 8pr. & M.	3	21·80 f	900	780
b.	BENBOW ..	25,000	29,000	..	12	..	9–8	..	..	..	10 13·5in., 12 6in., 2 3in. A.A., 4 8pr.	4	21	900	..
a.c.	BERWICK ..	9,800	22,681	1903	4–2 H.S.	2½	..	5 N.S.	5–4 N.S.	4 N.S.	14 6in., 8 12pr., 3 8pr., 9 M.	2	23·61 f	800	587
														1,600	
a.c.	BLACK PRINCE	13,550	23,939	1906	6–4–3 K.S.	1–1	6	6	6	6	6 9·2in., 10 6in., 20 8pr., 2 M.	3	23·65 f	1,000	704
														2,000	
b.	BRITANNIA ..	16,350	18,725	1906	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 12in., 4 9·2in., 10 6in., 12 12pr.,12 3pr., M.	4	18·74 f	950	825
														2,150	
b.	BULWARK ..	15,000	15,000	1902	9 H.S.	3–2	8 K.S.	12 H.S.	12–5 H.S.	6–2 K.S.	4 12in., 12 6in., 16 12 pr., 2 3pr., & M.	4	18·15 f	900	781
														2,000	
b.	CÆSAR ..	14,900	12,000	1897	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 H.S.	4 12in., 12 6in., 16 12pr., 4 3 pr., 2 M., 2l.	5	18·7 f	900	757
														2,000	
b.	CANOPUS ..	12,950	13,500	1899	6 H.N.	3–1	6 H.N.	12 H.N.	12–5 H.N.	5 H.N.	4 12in., 12 6in., 10 12pr., 6 3pr., & M.	4	18·5 f	800	700
														1,850	

ARMOURED SHIPS—(*continued*).

Class	NAME.	Displacement.	Indicated Horse-Power.	Date of Completion.	Armour.						Armament.		Speed.	Coal.	Complement.
					Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.			
									Heavy Guns.	Second-ary.					
		tons.			in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	CARNARVON ..	10,850	21,489	1905	6–2 K.S.	2–½	..	4½ K.S.	6 N.S.	6	4 7·5in., 6 6in., 20 3pr., 2 M.	2	23·3 ‡	800	655
b.	CENTURION ..	23,000	28,200	1913	12–6	..	9	..	10	..	10 13·5in., 16 4in., 4 3pr.	3	22 ‡	900	900
a.c.	COCHRANE ..	13,550	23,654	1907	6–4–3 K.S.	½–1	6	6	6	6	6 9·2in., 4 7·5in., 24 3pr., 2 M.	3	23·29 ‡	1,000	704
b.	COLLINGWOOD	19,250	24,500	1910	10–6–4	½–1½	8	..	9		10 12·in., 18 4in., 4 3pr., 5 M.	3	21·5 ‡	900	724
b.	COLOSSUS	20,000	25,000	1911	11–3	2½	8	..	11	..	10 12in., 16 4in., 4 3pr., 5 M.	3	21·5 ‡	900	780c
b.	COMMON-WEALTH	16,350	18,538	1905	9 K.S.	2–1	8–7	12 K.S.	12–6 K.S.	7 K.S.	4 12in., 4 9·2in., 10 6in., 12 12pr., 12 3pr., M.	4	19·01 ‡	950	825
														2,150	
b.	CONQUEROR ..	22,500	29,835	1912	12	..	9	..	10	..	10 13·5in., 16 4in., 4 3pr., 5 M.	3	22·12	000	800
														2,700	
a.c.	CORNWALL ..	9,800	22,699	1904	4–2 K.S.	2–½	..	5 K.S.	5–4 K.S.	4 K.S.	14 6in., 8 12pr., 3 3pr., 9 M.	2	23·68 ‡	800	537
														1,600	

b.	CORNWALLIS. .	14,000	18,238	1904	7 K.S.	2–1	7	14 K.S.	11–6 K.S.	6 K.S.	4 12in., 12 6in., 10 12pr., 2 3pr., & M.	4	18·9 f	900	750
														2,000	
a. c.	CRESSY sbd.	12,000	21,240	1901	6 K.S.	3–2	..	5 K.S.	6 K.S.	5 K.S.	2 9·2in., 12 6in., 12 12pr., 3 3pr., 8 M., 21.	2	20·79 f	800	755
														1,600	
a.c.	CUMBERLAND	9,800	22,000	1904	4–2 K.S.	2–½	..	5	5–4	4 N.S.	14 6in., 8 12pr., 3 3pr., 9 M.	2	23·68 f	800	537
														1,000	
a.c.	DEFENCE ..	14,600	27,570	1909	6–4	1–½	3	..	8	7	4 9·2in., 10 7·5in., 16 12pr., 5M.	5	23·5 f	1,000	850
a.c.	DEVONSHIRE. .	10 850	21,475	1905	6–2	2–½	..	4½ N.S.	6 N.S.	6	4 7·5in., 6 6in., 20 3pr., 2 M.	2	22·97 f	800	655
														1,600	
b.	DOMINION ..	16,350	18,438	1905	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 K.S.	7	4 12in., 4 9·2in., 10 6in., 12 12pr., 12 3pr., M.	4	19·5 f	950	825
														2,150	
a.c.	DONEGAL ..	9,800	22,178	1908	4–2 K.S.	2–½	..	5 K.S.	5–4	4 K.S.	14 6in., 8 12pr., 3 3pr., 9 M.	2	23·56 f	800	537
														1,600	
a.c.	DRAKE ..	14,100	31,450	1902	6 K.S.	3–2	..	5 K.S.	6–5 K.S.	5 K.S.	2 9·2in., 16 6in., 12 12pr., 3 3pr., 2 M.	2	24·11 f	1,250	900
														2,500	
b.	DREAD-NOUGHT	17,900	27,500	1906	11–6–4 K.C.	2½–1½	8	..	11	..	10 12in., 24 12pr. Q.F., 5 M.	5	21·85 f	900	770
														2,700	
a.c.	DUKE OF EDINBURGH	13,550	23,685	1906	6–4–3 K.S.	½–1	6	6	6	6	6 9·2in., 10 6in., 20 3.pr, 2 M.	3	22·84 f	1,000	704
b.	DUNCAN ..	14,000	18,222	1903	7 K.S.	2-1	7	14 K.S.	11–6 K.S.	6 K.S.	4 12in., 12 6in., 10 12pr., 2 3pr., & M	4	18·9 f	900	750
														2,000	

ARMOURED SHIPS—(*continued*).

Class	NAME.	Displacement.	Indicated Horse-Power.	Date of Completion.	Armour.						Armament.		Speed.	Coal.	Complement.
					Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.			
									Heavy Guns.	Secondary.					
		tons.			in.	in.	in.	in.	in.	in.			knots.	ton.	
b.	EMPEROR OF INDIA	25,000	22,000	—	12	—	9–8	—	—	—	10 12·5in., 12 6in., 2 8in., A.A., 4 3pr.	4	21	900	—
a.c.	ESSEX	9,800	22,000	1903	4–2 K.S.	2–¾	—	5	5	4 K.S.	14 6in., 8 12pr., 8 3pr., 8 M., 2 l.	2	23.79 f	800	587
														1,600	
a.c.	EURYALUS shd.	12,080	21,318	1904	6 K.S.	3–2	2	5 K.S.	6 K.S.	5 K.S.	2 9·2in., 12 6in., 12 12pr., 3 3pr., 3m	2	21·68 f	800	755
														1,600	
b.	EXMOUTH ..	14,000	18,346	1903	7 K.S.	2–1	7	14 K.S.	11–6 K.S.	6 K.S.	4 12in., 12 6in., 10 12pr., 2 3pr., & M	4	19·0	900	750
														2,000	
b.	FORMIDABLE	15 000	15,000	1901	9 H.S.	3–2	2	12 H.S.	12–5	6 K.S.	4 12in., 12 6in., 16 12pr., 2 3pr., & M	4	18·12 f	900	731
														2,000	
b.	GLORY ..	12,950	13,500	1901	6 H.N.	3–2	6 H.N.	12 H.N.	12–5 H.N.	5 H.N.	4 12in., 12 6in., 10 12pr., 6 3pr., & M	4	19·12 f	800	700
														1,850	
b.	GOLIATH ..	12,950	13,500	1900	6 H.N.	3–2	6 H.N.	12 H.N.	12–5 H.N.	5 H.N.	4 12in., 12 6in., 10 12pr., 6 3pr., & M	4	19·4 f	800	700
														1,850	

a.c.	GOOD HOPE ..	14,100	31,071	1902	6 K.S.	3–2	..	5 K.S.	6–5 K.S.	5 K.S.	2 9·2in., 16 6in., 12 12pr., 3 3pr., 2 M	2	23·5 *t*	1,250	900
														2,500	
a.c.	HAMPSHIRE ..	10,850	21,508	1905	6–2 K.S.	2–3¼	..	5 K.S.	5–4 N.S.	..	4 7·5in., 6 6in., 20 3pr., 2M	2	23·47 *t*	800	655
														1,600	
b.	HANNIBAL ..	14,900	12,000	1897	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 H.S.	4 12in., 12 6in., 16 12pr., 4 3pr., 2 M., 2 1.	5	18·0 *t*	900	757
														2,300	
b.	HERCULES ..	20,000	25,700	1911	11–3	2½	8	..	11	..	10 12in., 16 4in., 4 3pr., 5M	3	21·5 *t*	900	780
b.	HIBERNIA ..	16,350	13,060	1906	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 12in., 4 9·2in., 10 6in., 12 12pr., 12 3pr., & M	4	19·0	950	825
														2,150	
b.	HINDUSTAN ..	16,350	18,521	1905	9 K.S.	2–1	8–7	12 K.S.	12–6 N.S.	7 N.S.	4 12in., 4 9·2in., 10 6in., 12 12pr., 12 3p.r, & M	4	19·01 *t*	950	825
														2,150	
a.c.	HOGUE shd.	12,000	21,432	1902	6 K.S.	3	2 H.S.	5 K.S.	6 K.S.	5 K.S.	2 9·2in., 12 6in., 12 12pr., 3 3pr., 3 M., 2 1.	2	22·6 *t*	800	755
														1,600	
b.	ILLUSTRIOUS	14,900	12,000	1898	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 H.S.	12in., 12 6in., 16 12pr., 4 3pr., 2M., 2 1.	5	16·5 *t*	900	757
														2,200	
b.	IMPLACABLE	15,000	15,000	1902	9 K.S.	3–2	2	12 K.S.	12–5 K.S.	6	4 12in., 12 6in., 16 12pr., 2 3pr., & M.	4	18.2 *t*	900	781
														2,000	
b.	IRRESISTIBLE	15,000	15,000	1901	9 K.S.	3–2	2	12 K.S.	12–5 K.S.	6	4 12in., 12 6in., 16 12pr., 2 3pr., & M	4	18·2 *t*	900	781
														2,000	
b.c.	INVINCIBLE ..	17,250	41,000	1909	7–4 K.C.	..	3	..	7	..	8 12in., 16 4in., 5 M	5	26	1,000	780
b.c.	INFLEXIBLE ..	17,250	41,000	1908	7–4 K.C.	..	3	..	7	..	8 12in., 16 4in., 5 M	5	26	1,000	780

ARMOURED SHIPS—(*continued*).

Class	NAME.	Displacement.	Indicated Horse-Power.	Date of Completion.	Armour.						Armament.		Speed.	Coal.	Complement.
					Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.			
									Heavy Guns.	Secondary.					
		tons.			in.	in.	in.	in.	in.	in.			knots.	tons.	
b.c.	INDOMITABLE	17,250	41,000	1908	7–4 K.C.	..	8	..	7	..	8 12in., 16 4in., 5 M	5	26	1,000	780
b.c.	INDEFATIGABLE ..	18,750	43,000	1911	7–4	..	8	..	7	..	8 12in., 16 4in., 4 3pr. 5 M	2	25	1,000	790
b.	IRON DUKE ..	25,000	30,000	1914	12	..	9–6	..	..	..	10 13·5in. 12 6in., 2 8in., A.A., 4 3pr.	4	22 *t*	900	..
b.	JUPITER ..	14,900	12,000	1897	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 K.S.	4 12in., 12 6in., 16 12pr., 4 3pr., 2 M, 2 l.	5	18·4 *t*	900	757
														2,200	
a.c.	KENT	9,800	21,000	1903	4–2 K.S	2–5¼	..	5 K.S.	5–4 N.S.	4 K.S.	14 6in., 8 12pr., 3 3pr., 8 M., 2 l.	2	21·7 *t*	800	537
														1,600	
b.	KING EDWARD VII.	16,350	18,138	1905	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 N.S.	7	4 12in., 4 9·2in., 10 6in., 12 12pr., 12 3pr., M	4	19·04 *t*	950	825
														1,200	
b.	KING GEORGE V.	23,000	23,005	1912	12–6	..	9	..	10	..	10 13·5in., 16 4in., 4 3pr.	3	22 *t*	900	900
a.c.	KING ALFRED	14,100	30,893	1903	6–5–4 K.S.	2½–1	..	5 K.S.	6–5 K.S.	5 K.S.	2 9·2in., 16 6in., 12 12pr., 3 3pr., 2 l.	2	23·46 *t*	1,250	900
														2,500	

a.c.	LEVIATHAN ..	14,100	31,203	1903	6–5–4 K.S.	2½–1	..	5 K.S.	6–5 K.S	5 K.S.	2 9·2in., 16 6in., 12 12pr., 3 3pr., 2 l.	2	23·28 *t*	1,250 2,500	900	
a.c.	LANCASTER ..	9,800	22,000	1904	4–2 K.S.	2–¾	..	5 K.S.	5–4 N.S.	4 K.S.	14 6in., 8 12pr., 3 3pr., 9 M.	2	24·01 *t*	800 1,600	537	
b.c.	LION	26,350	75,685	1912	9	..	6	..	9	..	8 13·5in., 16 4in., 4 3pr., 5 M.	2	28·5 *t*	3,000	980	
b.	LONDON ..	15,000	15,000	1902	9 K.S.	3–2	2	12 K.S.	12–5 K.S.	6	4 12in., 12 6in., 16 12pr. 2 3pr., & M.	4	18·1 *t*	900 2,000	781	
b	LORD NELSON	16,500	16,750	1908	12–6 K.C.	..	8	8	12	..	4 12in., 10 9·2in., 24 12pr. 2, 3pr., 5 M.	5	18·9 *t*	900 2,200	747	
b.	MALAYA ..	27,500	..	..	13	..	..	..	10	..	8 15in., 12 6in.	..	25	Oil	..	
b.	MAGNIFICENT	14,900	12,000	1895	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 K.S.	4 12in., 12 6in., 16 12pr., 4 3pr., 2M., 2 l.	5	17·6 *t*	900 2,200	757	
b.	MAJESTIC ..	14,900	12,000	1895	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 K.S.	4 12in.—12 6in., 16 12pr., 4 3pr., 2 M., 2 l.	5	17·9 *t*	900 2,200	757	
b.	MARS	14,900	12,000	1897	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 K.S.	4 12in., 12 6in., 16 12pr., 4 3pr., 2 M., 2 l.	5	17·7 *t*	900 2,200	757	
b.	MARL-BOROUGH	25,000	29,000	1914	12	..	9–8	..	..	..	10 13·5in., 12 6in., 2 3in., A.A., 4 3pr.	4	22 *t*	900	..	
a.c.	MINOTAUR ..	14,600	27,856	1903	6–4	1–½	6	..	8	7	4 9·2in., 10 7·5in., 16 12pr., 5 M.	5	23·01 *t*	1,000	850	
b.	MONARCH ..	22,500	28,555	1912	12	..	9	..	10	..	10 13·5in., 16 4in., 4 3pr.	3	21·88 *t*	900	800	
a.c.	MONMOUTH ..	9,800	22,000	1903	4–2 K.S.	2–¾	4 K.S.	5 K.S.	5–4 N.S.	4 K.S.	14 6in., 8 12pr., 3 3pr., 8 M., 2 l.	2	22·58 *t*	2,700 800 1,600	537	

ARMOURED SHIPS—*(continued)*.

Class	NAME.	Displacement.	Indicated Horse-Power.	Date of Completion.	Armour.						Armament.		Speed.	Coal.	Complement.
					Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.			
									Heavy Guns.	Secondary.					
		tons.			in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	NATAL ..	18,550	23,582	1907	6–4–3 K.S.	1–1	6	6	6	6	6 9·2in., 4 7·5in., 24 3pr., 2 M.	3	23·33 ‡	1,000	704
b.	NEPTUNE ..	19,900	27,721	1911	11–3	2½	3	..	11	..	10 12in., 16 4in., 4 .. 5 M.	3	21·78 ‡	900	780
b.c	NEW ZEALAND	18,800	46,894	1912	..	..	..	..	..	..	8 12in., 16 4in., 4 3 pr., 5M.	2	25	1,000	780
b.	OCEAN ..	12,950	13,500	1900	6 M.N.	2–1	6	12 M.N.	12–5 M N	5 M.M.	4 12in., 12 6in., 10 12pr., 6 3pr., & M.	4 (4 sub.)	18·74 ‡	800	700
														1,850	
b.	ORION	22,500	29,108	1911	12	..	9	..	10	..	10 13·5in., 16 4in., 4 3pr., 5 M.	3	21·02 ‡	900	800
														2,700	
b.	PRINCE GEORGE	14,900	12,000	1896	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6	4 12in., 12 6in., 16 12pr., 4 3pr., 2 1.	5	18·3 ‡	900	757
														2,200	
b.	PRINCE OF WALES	15,000	15,000	1904	9 K.S.	2–1	3	12 K.S.	12–6 K.S.	6–2 K.S.	4 12in.' 12 6in., 16 12pr., 2 3pr., & M.	4	18·0	900	781
b.c.	PRINCESS ROYAL ..	26,350	76,510	1912	9	..	6	..	9	..	8 13·5in., 16 4in., 4 3pr., 5 M.	2	28·5 ‡	3,000	980

b.c.	QUEEN MARY	27,000	78,700	..	9	..	6	..	9	..	8 13·5in., 16 4in., 4 3pr., 5 M.	2	28 f	3,000	1000
b.	QUEEN ELIZABETH	27,500	60,000	..	13	..	..	..	10	..	8 15in., 12 6in.	..	25	Oil	..
b.	QUEEN	15,000	15,000	1904	9 K.S.	2–1	8	12 K.S.	12–6 N.S.	6–2 K.S.	4 12in., 12 6in., 18 12pr., 4 3pr., & M.	4	18·89 f	900	761
b.	RAMILLIES ..	25,750	..	..	13	..	..	..	10	..	8 15in., 12 6in.	..	21	..	..
b.	RESOLUTION..	25,750	..	..	13	..	..	..	10	..	8 15in., 12 6in.	..	21	..	..
b.	REVENGE ..	25,750	..	..	13	..	..	..	10	..	8 15in., 12 6in.	..	21	..	..
b.	ROYAL OAK ..	25,750	..	..	13	..	..	..	10	..	8 15in., 12 6in.	..	21	..	..
b.	ROYAL SOVEREIGN	25,750	..	..	13	..	..	..	10	..	8 15in., 12 6in.	..	21	..	..
c.s.	ROXBURGH ..	10,850	22,102	1905	6–2 K.S.	2–½	..	4½ K.S.	6 N.S.	6	4 7·5in., 6 6in., 20 3pr., 2 M.	2	23·63 f	800	655
														1,600	
b.	RUSSELL ..	14,000	18,229	1903	7 K.S.	2–1	7 K.S.	14 K.S.	11–6 K.S.	6 K.S.	4 12in., 12 6in., 10 12pr., 2 3pr., & M.	4	19·3 f	900	750
														2,060	
b.	ST. VINCENT ..	19,250	24,500	1910	10	½–1½	8	..	9	..	10 12in., 18 4in., 4 3pr., 5 M.	3	21·9 f	900	780
c.c.	SHANNON ..	14,600	28,553	1908	6–4	1–½	30	..	8	..	4 9·2in., 10 7·5in., 16 12pr., 5 M.	5	22·49 f	950	85
c.c.	SUFFOLK ..	9,800	22,000	1904	4–2 K.S.	2–½	..	5 K.S.	5–4 N.S.	4 K.S.	14 6in., 6 12pr., 3 3pr., 9 M.	2	24·7 f	800	537
														1,000	
c.c.	SUTLEJ shd.	12,000	21,261	1902	6 K.S.	3–2	..	5 K.S.	6 K.S.	5 K.S.	2 9·2in., 12 6in., 12 12pr., 3 3pr., 8 M., 2 1.	2	21·77 f	800	755
														1,600	
b.	SUPERB ..	18,600	23,000	1909	11–6–4 K.C.	..	8	..	11 K.C.	..	10 12in., 16 4in. B.L., 4 3pr., 5 M.	3	21·6 f	900	870
b.	TEMERAIRE ..	18,600	23,000	1909	11–6–4 K.C.	..	8	..	11 K.C.	..	10 12in., 16 4in. B.L., 4 3pr., 5 M.	3	22·67 f	900	870
b.c.	TIGER	28,000	100,000	..	..	..	..	..	..	..	8 13·5in., 12 6in.	..	28	3,000	..
b.	SWIFTSURE ..	11,800	12,500	1904	7	8	7	..	10	7 K.S.	4 10in., 14 7·5in., 14 14pr., 4 6pr., & M.	2	19·6 f	800	700
														2,000	

ARMOURED SHIPS—(*continued*).

Class	NAME.	Displacement.	Indicated Horse-Power.	Date of Completion.	Armour.						Armament.		Speed.	Coal.	Complement.
					Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.			
									Heavy Guns.	Secondary.					
		tons.			in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	TRIUMPH ..	11,800	12,500	1904	7	3	7	..	10	7 K.S.	4 10in., 14 7·5in., 14 14pr., 4 6pr., & M.	2	19·6 f	800	700
b.	THUNDERER ..	22,500	27,604	1912	12	..	9	..	10	..	10 13·5in., 16 4in., 4 3pr., 5 M.	3	21	2,000 800	800
b.	VALIANT ..	27,500	60,000	..	13	..	..	..	10	..	8 15in., 12 6in.	..	25	2,700 Oil	..
b.	VANGUARD ..	19,250	24,500	1910	10	¾–1¼	8	..	9	..	10 12in., 18 4in., 4 3pr., 5 M.	3	22·1 f	900	724
b.	VENERABLE ..	15,000	15,345	1902	7 K.S.	4–2½	3	14 K.S.	11–6 K.S.	6–2	4 12in., 12 6in., 10 12pr., 2 3pr., & M.	4	18·3 f	900	781
b.	VENGEANCE ..	12,950	13,500	1901	6 K.S.	2–1	6	12 K.S.	12–6 K.S.	5 K.S.	4 12in., 12 6in., 10 12pr., 6 3pr., & M.	4	18·5 f	2,000 800	750
b.	VICTORIOUS ..	14,900	12,000	1897	9 H.S.	3–2½	9	14–9 H.S.	14–6 H.S.	6	4 12in., 12 6in., 16 12pr., 4 3pr., 8 M., 2 l.	5 (4 sub.)	18·7 f	1,850 900	757
a.c.	WARRIOR ..	13,550	23,541	1907	6–4–3 K.S.	¾–1	6	6	6	6	6 9·2in., 4 7·5in., 24 3pr., 2 M.	3	22·9 f	2,200 1,000	704
b.	WARSPITE ..	27,500	60,000	..	13	..	..	..	10	..	8 15in., 12 6in.	..	25	Oil	..
b.	ZEALANDIA .. (*ex* New Zealand)	16,350	18,440	1905	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 K.S.	7	4 12in., 4 9·2in., 10 6in., 12 12pr., 12 3pr., M.	4	18·59 f	950	825
	4 Armoured ships	..	..	Pro.	..	..	..	..	..	..	..	..	..	2,150 ..	..

CRUISING SHIPS.

Class	NAME.		Displacement.	Indicated Horse-Power.	Date of Completion.	Armour.		Armament.		Speed.	Coal.	Complement.
						Belt. / Deck.	Gun Position.	Guns.	Torpedo Tubes.			
			tons.			in.	in.			knots.	tons.	
P. 3rd cl. Cr.	ACTIVE		3,440	18,000	1911	..	..	10 4in. B.L., 4 3pr., and M.	2	26·0 t	350	320
.. ..	AMPHION		3,440	18,800	1913	..	..	10 4in. B.L., 4 3pr., and M.	2	25·5	350	320
Scout.	ADVENTURE		2,670	15,850	1905	2	½	9 4in.	2	25·42 t	227	268
..	AMETHYST		3,000	14,200	1905	..	..	12 4in., 3 3pr., M.	2	23·42 t	300	296
P. 1st cl. Cr.	AMPHITRITE	shd.	11,000	18,000	1900	4	3–6 H.S.	16 6in., 12 12pr., 3 3pr., 2M.	2 (1 sub.)	20·75	1,000	677
	ARGONAUT	shd.	11,000	18,000	1900	4	3–6 H.S.	16 6in., 12 12pr., 3 3pr., 2 M.	2 (1 sub.)	20·75	1,000	677
L. Cr.	ARETHUSA		3,750	30,000	..	3	..	2 6in., 8 4in.	2	29	Oil	..
.. ..	AURORA		3,750	30,000	..	–	..	2 6in., 8 4in.	2	29	Oil	..
P. 3rd cl. Cr.	ASTRÆA	shd.	4,360	9,112	1894	2–1	3	2 6in., 8 4·7in., 8 6pr., 1 3pr., M.	3	19·75	400	312
Scout	ATTENTIVE		2,670	16,212	1906	2	½	9 4in.	2	25·88 t	227	268

Cruising Ships—(*continued*).

Class	NAME.	Displacement.	Indicated Horse-Power.	Date of Completion.	Armour. Belt.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.			in.		in.			knots.	tons.	
P. 3rd cl. Cr.	BELLONA	3,360	18,000	1910	½–1		..	6 4in. B.L., 4 3pr. and M.	2	25·9 ‡	450	268
P. 2nd cl.	BIRMINGHAM	5,440	26,500	1914	..		..	9 6in., 4 3pr.	2	25·5	650	..
P. 3rd cl. Cr.	BLANCHE	3,350	18,542	1910	..		..	10 4in. B.L., 4 3pr., and M.	2	25·67 ‡	350	292
„ „	BLONDE	3,350	18,770	1911	..		..	10 4in. B.L., 4 3pr., & M.	2	25·43 ‡	350	292
„ „	BOADICEA	3,300	18,000	1909	½–1		..	6 4in., B.L., 4 3pr., and M.	2	25·75 ‡	450	263
P. 2nd cl. Cr.	BRISTOL	4,800	24,529	1910	2–4½		..	2 6in., 10 4in. B.L., 4 M.	2	26·84	650	376
L. Cr.	CALLIOPE	3,300	30,000	..			..	2 6in., 8 4in.	..	29	Oil	..
„	CAROLINE	3,300	30,000	..			..	2 6in., 8 4in.	..	29	Oil	..
„	CARYSFORT	3,300	30,000	..	3		..	2 6in., 8 4in.	..	29	Oil	..
„	CHAMPION	3,300	30,000	..	–		..	2 6in., 8 4in.	..	29	Oil	..
„	CLEOPATRA	3,300	30,000	..			..	2 6in., 8 4in.	..	29	Oil	..
„	COMUS	3,300	30,000	..			..	2 6in., 8 4in.	..	29	Oil	..

..	..	CONQUEST	..	..	3,800	30,000	..	3	..	2 6in., 8 4in.	..	29	Oil	..
..	..	CORDELIA	..	..	3,800	30,000	..	—	..	2 6in., 8 4in.	..	29	Oil	..
P. 2nd cl. Cr.	..	CHALLENGER	..	..	5,880	12,500	1904	3–2	..	11 6in., 8 12pr., 1 3pr., 2 M.	2	21·0	500	454
P. 3rd cl. Cr.	..	CHARYBDIS		shd.	4,360	9,000	1895	2–1	2	2 6in., 8 4·7in.,8 6pr., 1 3pr., M.	3	19·5	400	312
P. 2nd cl. Cr.	..	CHATHAM	..	..	5,400	25,901	1912	3 / 1	..	8 6in., 4 3pr., 4 M., 1 l.	2	25·5	650	400
..	..	CRESCENT		shd.	7,700	12,000	1894	5–1	6	1 9·2in., 12 6in., 12 6pr., 5 3pr., M.	2 (1 sub)	19·7	850	560
..	..	DARTMOUTH	..	..	5,250	23,467	1911	2–½	..	8 6in., 4 3pr., 4 M.	2	25·9 ‡	650	390
P. 3rd cl. Cr.	..	DIAMOND	..	..	3,000	10,066	1905	..	..	12 4in., 8 3pr., M.	2	22.17 ‡	300	296
P. 2nd cl. Cr.	..	DIANA	..	shd.	5,600	9,600	1898	2½	3	11 6in.,8 12 pr., 1 3pr., 5 M., 1 l.	3	19·5	550	449
..	..	DIDO	..	shd.	5,600	9,600	1898	2½	3	11 6in., 8 12pr.,1 3pr., 5 M., 1 l.	3 (2 sub)	19·5	550	449
..	..	DORIS	..	shd.	5,600	9,600	1898	2½	3	11 6in., 8 12pr., 1 3pr., 5 M., 1 l.	3 (2 sub)	19·5	550	449
P. 2nd cl.Cr.	..	DUBLIN	..	..	5,400	25,000	1913	3 / 1	..	8 6in., 1 12pr., 4 3pr., 4 M., 1 l.	2	25·5	650	400
..	..	ECLIPSE	..	shd.	5,600	9,600	1897	1½–3	3	5 6in., 6 4·7in., 8 12pr., 1 3pr., 5 M., 1 l.	3	19·5	550	456
..	..	EDGAR	..	..	7,350	12,000	1893	5–1	6	2 9·2in., 10 6in., 12 6pr., 5 3pr., M.	4	20·5	850	544
..	..	ENDYMION	..	..	7,350	12,000	1894	5–1	6	2 9·2in., 10 6in., 12 6pr., 5 3pr., M.	2	20·5	850	544

CRUISING SHIPS—(*continued*).

Class	NAME.	Displacement.	Indicated Horse-Power.	Date of Completion.	Armour. Belt.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.			in.		in.			knots.	tons.	
P. 1st cl. Cr.	EUROPA .. .. shd.	11,000	16,500	1899	4–2½		4½–2	16 6in., 12 12pr., 3 3pr., 2 M.	2	20·5	1,000	357
P. 2nd cl. Cr.	FALMOUTH	5,250	23,467	1911	2–½		..	8 6in., 4 3pr., 4 M.	2	25·5	650	390
P. 3rd cl. Cr.	FEARLESS	3,440	18,900	1913	..		..	10 4in., 4 3pr.	..	25·5	350	320
.. ..	FOX.. .. .. shd.	4,360	9,000	1895	2–1		2	2 6in., 8 4·7in., 1 12pr., 13 6pr., 3pr., M.	3	19·5	400	312
Scout	FORESIGHT	2,850	14,277	1905	1½–½		..	9 4in.	2	25·12 ½	250	268
.. .. ..	FORWARD	2,850	15,018	1905	1½–½		..	9 4in.	2	25·15 ½	250	268
L. Cr.	GALATEA..	3,750	30,000	..	3		..	2 6in., 8 4in.	2	29	Oil	..
P. 2nd cl. Cr.	GIBRALTAR .. shd.	7,700	12,000	1894	5–1		6	2 9·2in., 10 6in., 12 6pr., 5 3pr., M.	2	19·7	850	544
.. .. ..	GLASGOW	4,800	22,472	1910	2–½		..	2 6in., 10 4in., 1 12pr., 4 3pr.	2	25·8 ½	650	376
.. .. ..	GLOUCESTER	4,800	23,757	1910	2–½		..	2 6in., 10 4in., 1 12pr., 4 3pr.	2	25·29 ½	650	376
.. ..	GRAFTON	7,350	12,000	1894	..		6	2 9·2in., 10 6in., 12 6pr., 5 3pr., M.	2	20·0	850	560

xv. **A CHINA RIVER GUNBOAT.** *Cribb, Southsea.*

" " ..	HAWKE	7,350	12,000	1893	5–1	6	2 9·2in., 10 6in., 12 6pr., 5 3pr., M.	2	20·0	850	544
" " ..	HERMES .. .. shd.	5,600	10,000	1900 1902	1½–3	3	11 6in., 8 12pr., 1 3pr., 2 M	2	20·0	600	456
" " ..	HIGHFLYER .. shd.	5,600	10,000	1900	1½–3	3	11 6in., 8 12pr., 1 3pr., 2 M.	2	20·0	600	456
" " ..	HYACINTH .. shd.	5,600	10,000	1901	1½–3	3	11 6in., 8 12pr., 1 3pr., 2 M.	2	20·0	600	456
P. 3rd cl. Cr. ..	HERMIONE .. shd.	4,360	9,000	1895	2–1	2	2 6in., 8 4·7in., 8 6pr., 1 8pr., M.	3	19·5	400	312
T.G.B.	HUSSAR	1.070	3,500	1895	..	2	1 4·7in., 2 6pr., M.	5	19·0	100	120
L. Cr.	INCONSTANT	3,750	30,000	..	3	..	2 6in., 8 4in.	2	29	Oil	..
P. 2nd cl. Cr. ..	ISIS.. .. .. shd.	5,600	9,600	1898	2½	3	11 6in., 8 12pr., 1 3pr., 5M., 1 l.	3 (2 sub.)	19·5	550	449
" " ..	JUNO .. .. shd.	5,600	9,600	1898	2½	3	11 6in., 8 12pr., 1 3pr., 5 M., 1 l.	3 (2 sub.)	19·5	550	449
P. 2nd cl. Cr. ..	LIVERPOOL	4.800	24,614	1910	2–½	..	2 6in., 10 4in., B.L., 4 3pr.	2	26·17 †	650	376
" " ..	LOWESTOFT	6440	22,000	1914	..	..	9 6 in., 4 3pr.	2	25·5	650	..
" " ..	MINERVA.. .. shd.	5,600	9,600	1897	1½–3	3	11 6in., 8 12pr., 1 3pr., 5 M., 1 l.	3 (2 sub.)	19·5	550	416
" ..	NEWCASTLE	4,800	24,669	1910	2–½	..	2 6in., 10 4in., B.L., 4 3pr.	2	26·26 †	650	376
" ..	NOTTINGHAM	5,440	22,000	1914	..	..	9 6in., 4 3pr.	2	25·5	650	..
P. Scout	PATHFINDER	2,940	17,176	1905	½–½	..	9 4in.	2	25·34 †	300	268
" ..	PATROL	2,940	16,460	1905	½–½	..	9 4in.		25·06 †	300	268
P. 3rd cl Cr. ..	PEGASUS	2,135	7,000	1899	2	·22	8 4in., 8 3pr., M.	2	20·0	250	234
										517	

Cruising Ships—(*continued*).

Class	NAME.	Displacement.	Indicated Horse-Power.	Date of Completion.	Armour. Belt.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
" " ..	PELORUS	tons. 2,135	7,000	1897	in. 2		in. ·22	8 4in., 8 3pr., M.	2	knots. 20·0	tons. 350	234
" " ..	PSYCHE	2,200	7,000	1900	2		·22	8 4in., 8 3pr., M.	2	20·0	517 250	234
" " ..	PROSERPINE	2,135	7,000	1899	2		·22	8 4in., 8 3pr., M.	2	20·0	517 250	234
" " ..	PYRAMUS	2,135	7,000	1900	2		·22	8 4in., 8 3pr., M.	2	20·0	517 250	234
L. Cr.	PENELOPE	3,750	30,000	..	3		..	2 6in., 8 4in.	2	29	517 Oil	..
L.Cr	PHAETON	3,750	30,000	..	3		..	2 6in., 8 4in.	2	29	Oil	..
P. 3rd cl. Cr. ..	PHILOMEL	2,575	7,500	1892	2–1		2	8 4·7in., 8 3pr., M	2	19·0	300	217
P. 2nd cl. Cr. ..	ROYAL ARTHUR shd.	7,700	12,000	1893	5–1		6	1 9·2in., 12 6in., 12 6pr., 5 3pr., M	2 (2 sub)	19·7	850	567
L.Cr.	ROYALIST	3,400	30,000	..	3		..	2 6in., 8 4in.	2	29	Oil	..
P. 3rd cl. Cr. ..	SAPPHIRE	3,000	10,200	1905	..		..	12 4in., 8 3pr., M	2	22·45	300	296

P. 3rd cl. Cr.	SAPPHO	3,400	9,861	1893	2–1	2	2 6in., 6 4·7in., 8 6pr., 1 3pr. M	4	20·47	400	273
P. Scout	SENTINEL	2,895	17,488	1905	$11\frac{1}{2}$–$5\frac{1}{2}$	..	9 4in.	2	25·07 t	205	268
P. 3rd cl. Cr. ..	SIRIUS .. shd.	3,600	9,000	1892	2–1	2	2 6in., 8 4·7in., 8 6pr., 1 3pr. M	4	19·75	400	273
P. Scout	SKIRMISHER	2,895	17,053	1905	$11\frac{1}{2}$–$5\frac{1}{2}$	..	9 4in.	2	25·19	205	268
P. 2nd cl. Cr. ..	SOUTHAMPTON	5,400	25,600	1913	8	..	8 6in., 4 3pr., 4 M., 1 l.	2	25·5	650	400
T.B.D.	SWIFT	1,800	30,000	1909	..	..	4 4in.	..	35·25	180 Oil	150
P. 2nd cl. Cr. ..	TALBOT .. .. shd.	5,600	9,600	1897	$11\frac{1}{2}$–3	3	11 6in., 8 12pr., 1 3pr., 5 M., 1 l.	3 (2 sub)	19·5	550	412
P. 1st cl. Cr. ..	TERRIBLE .. shd.	14,200	25,000	1898	3–6	6	2 9·2in., 16 6in., 14 12pr., 12 3pr., 9 M	4	22·4	1,500	840
										3,000	
P 2nd cl. Cr. ..	THESEUS	7,350	12,000	1894	5–1	6	2 9·2in., 10 6in., 12 6pr., 5 3pr., M	2 (2 sub)	20·0	850	544
P. 3rd cl. Cr. ..	TOPAZE	3,000	9,860	1905	..	..	12 4in., 8 3pr., M	2	22·1 t	300	296
L. Cr.	UNDAUNTED	3,750	30,000	..	..	3	2 6in., 8 4in.	2	29	..	..
P. 2nd cl. Cr. ..	VENUS .. .. shd.	5,600	9 600	1898	$2\frac{1}{2}$	3	11 6in., 8 12pr., 1 3pr., 5 M., 1 l.	3 (2 sub)	19·5	550	449
P. 2nd cl. Cr. ..	VINDICTIVE	5,750	10,000	1897	1–2 N.S.	3	10 6in., 8 12pr., 1 3pr., 5 M., 1 l.	2	20·1	500	429
P. 2nd cl. Cr. ..	WEYMOUTH	5,250	22,000	1911	$2\frac{3}{4}$	..	8 6in., 4 3pr., 4 M.	2	25·5 t	650	390
P. 2nd cl. Cr. ..	YARMOUTH	5,250	22,000	1912	$2\frac{3}{4}$	..	8 6in., 4 3pr., 4 M.	2	25·5 t	650	390
	4 light cruisers	1914-15 programme. Details not published.		Pro-	..	..	..	—	..	..	..	..

River Gunboats.—Robin, Nightingale, Snipe, Sandpiper (1897), 85 tons; Woodcock, Woodlark (1898), 150 tons, 2 6prs., 4 Maxims; Kinsha (1901), 616 tons, Teal, Moorhen (1902), 180 tons, 2 6prs., 18 knots: Widgeon (1905), 195 tons. *Despatch Vessels.*—Alacrity 1885), 1,700 and 1,650 tons. *Torpedo Gunboats* (some serving as mine sweepers).—Circe, Gossamer, Dryad, Halcyon, Harrier, Jason, Leda, Niger, Seagull, Skipjack, Spanker, Speedwell, and Speedy.

The following vessels have been struck off the effective list, but the armaments have not in every case been removed:—*Cruisers*: Brilliant, Furious, Ariadne, Diadem, and Spartiate. The following small craft have been placed on a "Special Service List" of "unprotected ships," Sphinx, Lapwing, Redbreast (East Indies), Ringdove (Fishery P.), Pomone (special service), Dwarf (W.C. Africa), Shearwater (British Columbia), Bramble, Britomart, Thistle, Clio, and Cadmus (China).

The following vessels are employed on special service:—Assistance and Cyclops, fleet repair ships; Woolwich, Blake, Blenheim, Hecla, Leander, St. George, and Tyne, torpedo depôt ships; Maidstone, Adamant, Alecto, Arrogant, Bonaventure, Forth, Mercury, Pactolus, Thames, Vulcan, Dolphin, Onyx, Antelope, Hebe, Sharpshooter, and Hazard, submarine depôt ships; Aquarius, distilling vessel; Iphigenia, Apollo, Naiad, Intrepid, Andromache, Latona, and Thetis, mine-laying vessels; and Seaflower, Seamew, Sparrow, Spider, and Driver, steam-trawlers for mine-sweeping duties, purchased April, 1909.

One destroyer depôt ship, one fleet repair ship, and one hospital ship the Mediator, purchased 1913.

ROYAL NAVAL RESERVED MERCHANT CRUISERS.

———	Name.	Owners.	Length.	Breadth.	Draught of Water for the Admiralty List.	Gross Tonnage.	Indicated Horse-Power.	Ocean Speed.
			Feet.	Feet.	Feet.	Tons.		Knots.
Ships in receipt of an annual subvention and permitted to fly the blue ensign.	MAURETANIA	Cunard Co. ..	785	88	33·6	31,938	68,000	26·6*
	LUSITANIA ..	Cunard Co. ..	785	88	33·6	31,550	68,000	26·6*

*Speed of best day's run, 1910.

In addition to the above, the Cunard Company holds all vessels for the time being the property of the Company at the disposal of His Majesty's Government for hire or purchase

DEFENCE FORCES OF THE DOMINIONS.

AUSTRALIA.

Class.	NAME.	Displacement.	Indicated Horse-Power.	Date of Completion.	Armour. Belt. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.			in.	in.			knots.	tons.	
b.c.	AUSTRALIA	18,800	48,000	1913	..	..	8 12in., 16 4in., 5 M.	2	26·0 t	1,000	790
P. 2nd cl. Cr.	MELBOURNE	5,400	25,500	1913	..	..	8 6in., 4 3pr. 4 M., 1 l.	2	25·5	..	..
.. ..	SYDNEY	5,400	25,500	1913	..	..	8 6in., 4 3pr., 4 M., 1 l.	2	25·5	..	..
.. ..	BRISBANE	5,400	25,500		..	..	8 6in., 4 3pr., 4 M ., 1 l.	2	25·5	..	..
.. ..	ENCOUNTER	5,880	12,500	1906	3–2	..	11 6in., 9 12pr., 1 3pr., 2M.	2	20·75	600	454
L. Cr.	PIONEER	2,200	7,000	1900	2	·22	8 4in., 11 3pr., M.	2	20·0	250	234
										517	

CANADA.

P. 1st cl. Cr.	NIOBE	11,000	16,500	1899	..	..	16 6in., 12 12pr., 3 3pr., 2M	2	20·5	1,000	600
P. 2nd cl. Cr.	RAINBOW .. shd.	3,600	9,000	1893	..	..	2 6in., 6 4·7in., 8 6pr., 1 3pr., 4 M., 1 l.	4	19·7	400	273

FLOTILLAS.

TORPEDO BOAT DESTROYERS.

Name or Number.	Launched.	Dimensions. Length.	Dimensions. Beam.	Displacement.	Indicated Horse-power.	Mean speed on Trial or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
		Feet.	Feet.	Tons.		Knots.				Tons
Bruiser	1895	201·6	19	265	4,500	27·97	1-12pr. 5-6prs.	1	45	60
Conflict	1894	205·6	20	320	4,370	27·21	1-12pr. 5-6prs.	2	50	60
Fervent	1895	200	19	275	3,800	[27]	1-12pr. 5-6prs.	1	50	70
Lightning ..	1895	200	19·7	275	4,007	27·94	1-12pr. 5-6prs.	2	50	60
Opossum	1895	200	19	295	4,052	28·24	1-12pr. 5-6prs.	1	50	60
Porcupine ..	1895	200	19·7	275	3,866	27·91	1-12pr. 5-6prs.	2	50	60
Ranger	1895	200	19	295	3,900	27·13	1-12pr. 5-6prs.	1	50	60
Sunfish	1895	200	19	295	4,292	27·62	1-12pr. 5-6prs.	1	50	60
Surly	1894	205·6	19·5	280	4,400	28·05	1-12pr. 5-6prs.	2	50	50
Zephyr	1895	200	19	275	3,850	[27]	1-12pr. 5-6pr.	1	50	60
Albatross	1898	227·6	21·25	430	7,900	31·5	1-12pr. 5-6prs.	2	68	100
Angler	1897	210	19·6	310	5,800	30·37	1-12pr. 5-6prs.	2	60	80
Arab	1901	218	20·0	470	6,000	31	1-12pr. 5-6prs.	2	60	80
Avon	1896	210·6	21·6	355	6,000	30	1-12pr. 5-6prs.	2	60	80
Bat	1896	215	20·75	360	6,185	30·1	1-12pr. 5-6prs.	2	60	91
Bittern	1897	210·6	21·6	355	6,000	30	1-12pr. 5-6prs.	2	60	80
Brazen	1896	218	20·0	345	6,000	30	1-12pr. 5-6prs.	2	60	80
Bullfinch	1898	210	20·6	345	5,800	30	1-12pr. 5-6prs.	2	60	80
Cheerful	1897	210	21·0	355	6,000	30	1-12pr. 5-6prs.	2	62	82
Coquette	1897	210	19·5	335	5,800	30·21	1-12pr. 5-6prs.	2	60	80
Crane	1896	215	20·7	360	6,336	30·3	1-12pr. 5-6prs.	2	60	80
Cygnet	1898	210	19·5	335	5,800	30·3	1-12pr. 5-6prs.	2	60	80
Cynthia	1898	210	19·5	355	5,800	30·2	1-12pr. 5-6prs.	2	60	80
Desperate ..	1896	210	19·6	310	5,800	30	1-12pr. 5-6prs.	2	60	80
Dove	1898	210·0	20·6	345	5,800	30	1-12pr. 5-6prs.	2	60	80
Earnest	1896	210·6	21·7	355	6,000	30·13	1-12pr. 5-6prs.	2	58	80
Electra	1896	218	20·0	350	6,000	30	1-12pr. 5-6prs.	2	58	80
Express	1897	227·6	22·0	465	9,800	31	1-12pr. 5-6prs.	2	60	80
Fairy	1897	227·6	22·0	355	6,000	30	1-12pr. 5-6prs.	2	60	80
Falcon	1899	229·0	21·3	375	6,000	30	1-12pr. 5-6prs.	2	60	80
Fame	1896	210·6	19·6	310	5,800	30·16	1-12pr. 5-6prs.	2	60	80
Fawn	1897	215	20·7	360	6,581	30·5	1-12pr. 5-6prs.	2	60	91
Flirt	1897	215	20·7	360	6,682	30	1-12pr. 5-6prs.	2	60	91
Flying Fish ..	1897	215	20·7	360	6,416	30·4	1-12pr. 5-6prs.	2	58	91
Foam	1896	210	19·6	310	5,800	30·18	1-12pr. 5-6prs.	2	58	80
Gipsy	1897	227·6	22·0	355	6,000	30	1-12pr. 5-6prs.	2	60	80
Greyhound ..	1900	210	21	385	6,000	30	1-12pr. 5-6prs.	2	60	90
Griffon	1896	210·0	20	355	6,000	30·11	1-12pr. 5-6prs.	2	58	80
Kestrel	1898	218	20·0	350	6,000	30	1-12pr. 5-6prs.	2	60	80
Kangaroo ..	1900	215	20·75	370	6,500	30	1-12pr. 5-6prs.	2	60	91
Leopard	1897	210	20·0	350	6,000	30	1-12pr. 5-6prs.	2	60	80
Leven	1898	218·0	20·0	370	6,000	30	1-12pr. 5-6prs.	2	58	80
Lively	1900	218	20·0	385	6,000	30	1-12pr. 5-6prs.	2	58	80
Locust	1896	210	21·7	355	6,000	30·16	1-12pr. 5-6prs.	2	58	80
Mallard	1896	210·6	19·6	310	5,800	30·11	1-12pr. 5-6prs.	2	60	80

TORPEDO BOAT DESTROYERS—(*continued*).

Name or Number.	Launched.	Dimensions. Length.	Dimensions. Beam.	Displacement.	Indicated Horse-power.	Mean speed on Trial or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
		Feet.	Feet.	Tons.		Knots.				Tons.
Mermaid	1898	210	21·0	355	6,000	30	1-12pr. 5-6prs.	2	60	82
Myrmidon.. ..	1900	215	20·75	370	6,500	30	1-12pr. 5-6prs.	2	62	91
Orwell	1898	218·0	20·0	360	6,000	30	1-12pr. 5-6prs.	2	58	80
Osprey	1897	227·6	22·0	355	6,000	30	1-12pr. 5-6prs.	2	60	80
Ostrich	1900	210	21·0	375	6,000	30	1-12pr. 5-6prs.	2	60	80
Otter	1896	210	20·0	350	6,000	30	1-12pr. 5-6prs.	2	60	80
Panther	1897	210·6	21·7	355	6,000	30·14	1-12pr. 5-6prs.	2	58	80
Peterel	1899	215	20·8	370	6,200	30	1-12pr. 5-6prs.	2	62	85
Quail	1895	213·6	21·6	355	6,000	30·38	1-12pr. 5-6prs.	2	58	90
Racehorse ..	1900	210	21	385	6,000	30	1-12pr. 5-6prs.	2	60	90
Recruit	1896	218·0	20·0	350	6,000	30	1-12pr. 5-6prs.	2	58	90
Roebuck	1901	210	21	385	6,000	30	1-12pr. 5-6prs.	2	60	90
Seal	1897	218·0	20·0	355	6,000	30·15	1-12pr. 5-6prs.	2	58	80
Spiteful	1899	215	20·75	365	6,500	30·1	1-12pr. 5-6prs.	2	62	81
Sprightly ..	1900	218	20·0	385	6,000	30	1-12pr. 5-6prs.	2	58	80
Stag	1900	210	19·75	320	5,800	30·34	1-12pr. 5-6prs.	2	60	80
Star	1896	215	20·75	360	6,266	30·7	1 12pr. 5 6prs.	2	58	91
Success	1901	210·0	21·0	380	6,000	30	1 12pr. 5 6prs.	2	62	43
Sylvia	1897	210	19·9	350	5,400	30	1 12pr. 5 6prs.	2	58	80
Syren	1900	215	20·75	390	6,500	30	1 12pr. 5 6prs.	2	..	91
Taku	1898	193·6	20	305	6,000	32	6 3pr. q.	3	..	67
Thorn	1900	210	21	380	6,000	30	1 12pr. 5 6prs.	2	58	80
Thrasher	1895	210·6	21·7	355	6,000	30·13	1 12pr. 5 6prs.	2	58	80
Vigilant	1900	210	21	380	6,000	30	1 12pr. 5 6prs.	2	58	80
Violet	1897	210	20·75	350	5,400	30	1 12pr. 5 6prs.	2	58	80
Virago	1895	210·6	21·7	355	6,000	30·13	1 12pr. 5 6prs.	2	58	80
Vixen	1900	210·0	20·0	400	6,000	30	1 12pr. 5 6prs.	2	62	88
Vulture	1898	218	20	345	6,000	30	1 12pr. 5 6prs.	2	58	80
Whiting	1896	215	20·75	360	6,239	30·2	1 12pr. 5 6prs.	2	58	91
Wolf	1897	218	20	355	6,000	30	1 12pr. 5 6prs.	2	58	80
Derwent	1904	220	23	534	7,000	25·68	4 12prs.	2	70	130
Eden	1903	220	23½	527	7,000	26·22	4 12prs.	2	70	130
Exe	..	225	23½	540	7,000	25 64	4 12prs.	2	70	127
Ribble	1904	225	23½	550	7,500	26	4 12prs.	2	70	126
Itchen	1903	225	23½	550	7,000	25·64	4 12prs.	2	70	130
Usk	..	225	23½	550	7,500	26	4 12prs.	2	70	120
Teviot	..	225	23½	55 0	7,500	26	4 12prs.	2	70	120
Ettrick	..	225	23½	540	7,000	25·56	4 12prs.	2	70	127
Foyle	..	225	23½	550	7,000	25·65	4 12prs.	2	70	120
Erne	..	225	23½	540	7,000	25·6	4 12prs.	2	70	127
Arun	..	225	23½	550	7,000	25·72	4 12prs.	2	70	130
Cherwell	..	225	23½	540	7,000	25·6	4 12prs.	2	70	127
Dee	..	225	23½	540	7,000	25·5	4 12prs.	2	70	127
Jed	1904	222	23½	540	7,500	25·78	4 12prs.	2	70	126
Kennet	1903	222	23½	540	7,500	25·99	4 12prs.	2	70	126
Velox	1902	210	23	440	8,000	27	1 12pr. 5 6prs.	2	63	130
Waveney ..	1903	230	23½	534	7,000	25·62	4 12prs.	2	70	130
Welland	1904	235	23½	550	7,500	26	4 12prs.	2	70	120

TORPEDO BOAT DESTROYERS—(*continued*).

Name or Number.	Launched.	Dimensions.		Displacement.	Indicated Horse-Power.	Mean speed on Trial or expected.	Armament.	Torpedo Tubes	Complement.	Coal Capacity.
		Length.	Beam.							
		Feet.	Feet.	Tons.		Knots.				
Chelmer	1904	222	23½	600	7,500	25·7	4 12prs.	2	72	95 / 126
Boyne	1904	223	23½	600	7,500	25·72	4 12prs.	2	72	95 / 126
Colne	1905	222	23½	600	7,500	25·57	4 12prs.	2	72	95 / 126
Doon	1904	222	23½	600	7,500	25·8	4 12prs.	2	72	95 / 126
Garry	1905	222	23½	600	7,500	26·5	4 12prs.	2	72	95 / 126
Kale	1904	223	23½	600	7,500	25·74	4 12prs.	2	72	95 / 126
Rother	1904	222	23½	600	7,500	25·51	4 12prs.	2	72	95 / 126
Liffey	1904	222	23½	600	7,500	25·51	4 12prs.	2	72	95 / 126
Moy	1904	222	23½	600	7,500	25·6	4 12prs.	2	72	95 / 126
Ness	1905	222	23½	600	7,500	25·62	4 12prs.	2	72	95 / 126
Nith	1905	222	23½	600	7,500	25·69	4 12prs.	2	72	95 / 126
Ouse	1905	222	23½	600	7,500	25·56	4 12prs.	2	72	95 / 126
Swale	1905	222	23½	600	7,500	25·59	4 12prs.	2	72	95 / 126
Ure	1904	222	23½	600	7,500	25·65	4 12prs.	2	72	95 / 126
Wear	1905	222	23½	600	7,500	25·62	4 12prs.	2	72	95 / 126

H.M.S. DREADNOUGHT FIRING A BROADSIDE AND FUSILLADE OF HER 12-in. GUNS.
[*Record Press.*

OCEAN-GOING DESTROYERS.

Name or Number.	Launched.	Dimensions.		Displacement.	Indicated Horse-power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal or Oil.
		Length.	Beam.							
		Feet.	Feet.	Tons.		Knots.				Tons.
Afridi	1907	250	25	872	14,250	32·75	5 12prs.	2	60	92½
Cossack	1907	270	26	890	14,000	33·15	5 12prs.	2	60	78
Ghurka	1907	255	25·7	880	14,250	34	5 12prs.	2	60	78
Mowhawk ..	1907	270	25	865	14,500	34·51	5 12prs.	2	60	74
Tartar	1907	270	26	870	14,500	35·67	5 12prs.	2	60	76
Saracen	1908	272	26	980	15,500	33·8	2 4in B.L.	2	67	84
Amazon	1908	280	26½	970	15,500	33·73	2 4in. B.L.	2	67	86
Crusader ..	1909	280	26	1,045	15,500	35	2 4in B.L.	2	71	99
Maori	1909	280	27	1,035	15,500	33	2 4in. B.L.	2	71	103
Nubian	1909	280	26½	985	15,000	34·88	2 4in. B.L.	2	71	97
Viking	1909	280	27·3	1,090	15,500	..	2 4in. B.L.	2	71	102
Zulu	1909	280	27	1,027	15,500	34	2 4in. B.L.	2	71	94
Albacore ..	1908	215	21	440	6,000	26·75	3 12prs.	2	43	..
Bonetta	1908	215	21	440	6,000	26·75	3 12prs.	2	43	..
Basilisk	1910	275	28	964	12,500	27·98	1 4in., 3 12prs.	2	96	120
Beagle	1909	269	26·7	940	12,500	27·12	1 4in., 3 12prs.	2	96	120
Bulldog	1909	269	26·7	940	12,500	27·4	1 4in., 3 12prs.	2	96	120
Foxhound ..	1909	269	26·7	940	12,500	27·7	1 4in., 3 12prs.	2	96	128
Grasshopper ..	1909	271	27½	890	12,500	27·04	1 4in., 3 12prs.	2	96	120
Harpy	1909	275	28	984	12,500	27·75	1 4in., 3 12prs.	2	96	120
Mosquito	1910	271	27½	890	12,500	27·12	1 4in., 3 12prs.	2	96	120
Nautilus	1910	267½	28	964	12,500	28·1	1 4in., 3 12prs.	2	96	120
Pincher	1910	271½	28½	940	12,500	27·17	1 4in., 3 12prs.	2	96	120
Racoon	1910	266	28	920	12,500	27·07	1 4in., 3 12prs.	2	96	120
Rattlesnake ..	1910	270½	27½	938	12,500	27·03	1 4in., 3 12prs.	2	96	120
Renard	1909	266	28	920	12,500	27·14	1 4in., 3 12prs.	2	96	120
Savage	1910	264	28	885	12,500	27·16	1 4in., 3 12prs.	2	96	..
Scorpion	1910	271	27·9	890	12,500	27·1	1 4in., 3 12prs.	2	96	..
Scourge	1910	266½	28	925	12,500	27·06	1 4in., 3 12prs.	2	96	..
Wolverine ..	1910	266	28	920	12,500	27·1	1 4in., 3 12prs.	2	96	..
Stour	1909	220	23·9	566	7,000	25·58	4 12prs.	2	..	66½
Test	1909	220	23·9	566	7,000	25·62	4 12prs.	2	..	66½
Acorn	1910	240	25·6	780	13,500	27·22	2 4in., B.L., 2 12prs.	2	72	85
Alarm	1910	240	25·6	780	13,500	27·2	2 4in., B.L., 2 12prs.	2	72	85
Brisk	1910	240	25·6	780	13,500	27·6	2 4in. B.L., 2 12-prs.	2	72	85
Camelon	1910	240	25·6	780	13,500	28·03	2 4in., B.L., 2 12prs.	2	72	85
Comet	1910	240	25·6	780	13,500	27·9	2 4in., B.L., 2 12prs.	2	72	85
Goldfinch	1910	240	25·6	780	13,500	28	2 4in., B.L., 2 12prs.	2	72	85
Fury	1911	240	25·6	780	13,500	27·3	2 4in., B.L., 2 12prs.	2	72	85
Hope	1910	240	25·6	780	13,500	27·1	2 4in. B.L., 2 12prs.	2	72	85
Larne	1910	240	25·6	780	13,500	28·72	2 4in B.L. 2 12prs.	2	72	85
Lyra	1910	240	25·6	780	13,500	28·88	2 4in. B.L., 2 12prs.	2	72	85
Martin;	1910	240	25·6	780	13,500	28·9	2 4in. B.L., 2 12prs.	2	72	85

OCEAN-GOING DESTROYERS—(*continued*).

Name or Number.	Launched.	Dimensions. Length.	Dimensions. Beam.	Displacement.	Indicated Horse-power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal or Oil.
		Feet.	Feet.	Tons.		knots.				
Minstrel	1911	240	25·6	780	13,500	28·9	2 4in. B.L., 12prs.	2 2	72	85
Nemesis	1910	240	25·6	780	13,500	27	2 4in. B.L., 12prs.	2 2	72	85
Nereide	1910	240	25·6	780	13,500	27·8	2 4in. B.L., 12prs.	2 2	72	85
Nymphe	1911	240	25·6	780	13,500	27·5	2 4in. B.L., 12prs.	2 2	72	85
Redpole	1910	240	25·6	780	13,500	29·8	2 4in. B.L., 12prs.	2 2	72	85
Rifleman	1910	240	25·6	780	13,500	29·3	2 4in. B.L., 12prs.	2 2	72	85
Ruby	1910	240	25·6	780	13,500	30·23	2 4in. B.L., 12prs.	2 2	72	85
Shelldrake ..	1911	240	25·6	780	13,500	28·3	2 4in. B.L., 12prs.	2 2	72	85
Staunch	1910	240	25·6	780	13,500	28·6	2 4in. B.L., 12prs.	2 2	72	85
Acheron	1911	251½	26·4	780	15,000	29·4	2 4in. Q.F., 12prs.	2 2	72	89
Ariel	1911	251½	26·4	780	15,000	29·4	2 4in. Q.F., 12prs.	2 2	72	89
Archer	1911	240	25·7	780	16,000	30·9	2 4in. Q.F., 12prs.	2 2	72	87
Attack	1911	240	25·7	780	16,000	30·6	2 4in. Q.F., 12prs.	2 2	72	87
Badger	1911	240	25·10	780	16,500	..	2 4in. Q.F., 12prs.	2 2	72	86
Beaver	1911	240	25·10	780	16,500	..	2 4in. Q.F., 12prs.	2 2	72	86
Defender	1911	240	25½	750	13,500	28·3	2 4in. Q.F., 12prs.	2 2	72	89
Druid	1911	240	25½	750	13,500	..	2 4in. Q.F., 12prs.	2 2	72	89
Garret	1911	240	25½	750	13,500	30·2	2 4in. Q.F., 12prs.	2 2	72	86
Forester	1911	240	25½	750	13,500	29·8	2 4in. Q.F., 12prs.	2 2	72	89
Hawk	1911	240	25½	750	13,500	..	2 4in. Q.F., 12prs.	2 2	72	89
Ad	1911	240	25½	750	13,500	28·1	2 4in. Q.F., 12prs.	2 2	72	89
rnet	1911	240	25½	750	13,500	..	2 4in. Q.F., 12prs.	2 2	72	89
ra	1912	240	25½	750	13,500	..	2 4in. Q.F., 12prs.	2 2	72	89
al	1911	240	25½	750	13,500	26·9	2 4in. Q.F., 12prs.	2 2	72	89
ss	1911	240	25½	750	13,500	28·6	2 4in. Q.F., 12prs.	2 2	72	89
wing	1911	240	25½	750	13,500	..	2 4in. Q.F., 12prs.	2 2	72	89
rd	1911	240	25½	750	13,500	..	2 4in. Q.F., 12prs.	2 2	72	89
							24in. Q.F., 12prs.	2		

OCEAN-GOING DESTROYERS—(*continued*).

Name or Number.	Launched.	Dimensions. Length.	Dimensions. Beam.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armaments.	Torpedo Tubes	Complement.	Coal or Oil.
		Feet.	Feet.	Tons.		Knots.				
Phœnix	1911	240	25¾	750	13,500	..	2 4in. Q.F., 2 12prs.	2	72	89
Sandfly	1911	246	25¾	750	13,500	27·7	2 4in. Q.F., 2 12prs.	2	72	89
Firedrake	1912	255	25·7	860	20,000	33·2	2 4in. Q.F., 2 12prs.	2	72	86
Lurcher	1912	255	25·7	860	20,000	35·3	2 4in. Q.F., 2 12prs.	2	72	86
Oak	1912	255	25·7	860	20,000	32·4	2 4in. Q.F., 2 12prs.	2	72	86
Acasta	1912	260	27	935	24,500	29	3 4 4in.	2	100	129
Achates	1912	260	27	935	24,500	32·3	3 4in.	2	100	129
Ambuscade ..	1913	260	27	935	24,500	30·4	3 4in.	2	100	129
Ardent	1913	260	28	935	24,000	29·5	3 4in.	2	100	142
Christopher ..	1912	260	27	935	24,500	29	3 4in.	2	100	129
Cockatrice ..	1913	260	27	935	24,500	00·9	3 4in.	2	100	129
Contest	1913	260	27	935	24,500	29·7	3 4in.	2	100	129
Fortune	1913	260	27	952	25,000	30·7	3 4in.	2	100	129
Garland	1913	260	27	952	24,500	31	3 4in.	2	100	..
Hardy (a) ..	1912	257	26½	935	24,500	32	3 4in.	2	100	..
Lynx	1913	260	27	935	24,500	32·9	3 4in.	2	100	129
Midge	1913	260	27	935	24,500	32·9	3 4in.	2	100	129
Owl	1913	260	27	935	24,500	32·9	3 4in.	2	100	129
Paragon	1913	257	26½	928	22,500	30·8	3 4in.	2	100	128
Porpoise ..	1913	257	26½	928	22,500	30·8	3 4in.	2	100	128
Unity	1913	257	26½	928	22,500	30·8	3 4in.	2	100	128
Victor	1913	257	26½	928	22,500	30·8	3 4in.	2	100	128
Shark	1912	260	27	935	24,500	31·4	3 4in.	2	100	129
Sparrowhawk ..	1912	260	27	935	24,500	30·7	3 4in.	2	100	129
Spitfire	1912	260	27	935	24,500	30·3	3 4in.	2	100	129
Laforey	1913	260	27·8	965	24,500	29	3 4in.	..	100	135
Lawford	1913	260	27·8	965	24,500	29	3 4in.	..	100	135
Louis	1913	260	27·8	965	24,500	29	3 4in.	..	100	135
Lydiard	1914	260	27·8	965	24,500	29	3 4in.	..	100	135
Leonidas	1913	260	27·8	965	24,500	29	3 4in.	..	100	135
Lucifer	1913	260	27·8	965	24,500	29	3 4in.	..	100	135
Llewellyn ..	1913	260	27·8	965	24,500	29	3 4in.	..	100	135
Lennox	1914	260	27·8	965	24,500	29	3 4in.	..	100	135
Laertes	1913	260	27·8	965	24,500	29	3 4in.	..	100	135
Lysander ..	1913	260	27·8	965	24,500	29	3 4in.	..	100	135
Laurel	1913	260	27·8	965	24,500	29	3 4in.	..	100	135
Liberty	1913	260	27·8	965	24,500	29	3 4in.	..	100	135
Loyal	1913	260	27·8	965	24,500	29	3 4in.	..	100	135
Legion	1914	260	27·8	965	24,500	29	3 4in.	..	100	135
Lance	1914	260	27·8	965	24,500	29	3 4in.	..	100	135
Lookout	1914	260	27·8	965	24,500	29	3 4in.	..	100	135
Lark	1913	260	27·8	965	24,500	29	3 4in.	..	100	135
Linnet	1913	260	27·8	965	24,500	29	3 4in.	..	100	135
Laverock ..	1913	260	27·8	965	24,500	29	3 4in.	..	100	135
Landrail	1914	260	27·8	965	24,500	29	3 4in.	..	100	135

Milne, Moorsom, Matchless, Morris, Murray, Myngs, Miranda, Minos, Manly, Mentor, Mansfield, Meteor, Mastiff, Lightfoot, and Marksman building.

TORPEDO BOATS.

Name or Number.	Launched.	Dimensions.		Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal or Oil.
		Length.	Beam.							
		Feet.	Feet.	Tons.		Knots.				
025-027 (3 boats)..	1886	127·5	12·5	60	600	21	2 3prs.	3	..	10
033..	1886	125	13	66	670	19·5	2 3prs.	5	15	20
034	1886	125	14·6	66	950	18–19	..	5	15	..
041, 042 (2 boats)	1886	127·5	12·5	60	700	21	2 3prs.	4	15	..
049-055 (7 boats)..	1886	127·5	12·5	60	700	21	2 3prs.	4	15	..
057, 058 (2 boats)..	1886	127·5	12·5	60	700	21	2 3prs.	4	15	..
065-068 (4 boats)..	1886	125	13	75	700	19·20	2 3prs.	5	15	20
071-074 (4 boats)..	1886	125	13	75	700	19 20	2 3prs.	5	15	20
076-078-(3 boats)..	1886	125	13	75	700	19-20	2 3prs.	5	15	20
079	1886	125	13	75	1,000	22·4	2 3prs.	..	15	20
80	1887	136	14	105	1,540	23	4 3prs.	5	21	30
81 (ex-Swift) ..	1885	150	17·5	125	..	..	6 3prs.	3	25	35
82, 83 (2 boats) ..	1889	130	13·5	85	1,100	23	3 3prs.	3	19	20
85-87 (3 boats) ..	1889	130	13·5	85	1,100	23	3 3prs.	3	19	20
88, 89 (2 boats) ..	1894	142	14·75	112	1,600	..	3 3prs.	3	18	20
90	1895	140	14·25	100	1,430	..	3 3prs.	3	18	18
91, 92 (2 boats) ..	1894	140	15·5	130	2,400	23·24	3 3prs.	3	18	25
93	1893	140	15·5	130	2,200	23·5	3 3prs.	3	18	25
95, 96 (2 boats) ..	1894	140	15 5	130	2,000	23·2	3 3prs.	3	18	25
97	1893	140	15 5	130	2,690	23·35	3 3prs.	3	18	25
98, 99 (2 boats) ..	1901	160	17	178	2,850	25	3 3prs.	3	32	20
101	1888	130·5	14	92	1,060	21	2 3prs.	3	18	35
102, 103 (2 boats)	1888	134·6	14·8	96	1,050	23·2	2 3prs.	3	18	..
104-105 (2 boats)..	1889	130	14·5	95	1,250	20	2 3prs.	3	18	..
107, 108 (2 boats)	1901	160	17	178	2,850	25	3 3prs.	3	32	20
109-113 (5 boats)..	1902	166	17·25	200	2,900	25	3 3prs.	3	32	42
114-117 (4 boats)..	1903	165	17·6	205	2,900	25	3 3prs.	3	32	28
5 boats (1-5) ..	1906	175	17½	235	3,750	26	2 12prs.	3	35	20
5 boats (6-10) ..	1906–7	166½	17½	255	3,750	27·3	2 12prs.	3	35	20
2 boats (11-12) ..	1907	172	18	225	3,750	26	2 12prs.	3	35	20
4 boats (13-16) ..	1907	182	18	256	4,000	26	2 12prs.	3	..	23·5
2 boats (17-18) ..	1907	180	18	251	4,000	26	2 12prs.	3	..	23·5
2 boats (19-20) ..	1907–8	178·6	18·3	280	4,000	26	2 12prs.	3	..	23·5
2 boats (21-22) ..	1907–8	185	18·6	308	4,000	26	2 12prs.	3	..	23·5
No. 23	1907	177·3	18	253	4,000	26	2 12prs.	3	..	23·5
No. 24	1908	177	17·9	292	4,000	26	2 12prs.	3	..	23·5
4 boats (25-28) ..	1908	182	18	283	4,000	26	2 12prs.	3	..	25
2 boats (29-30) ..	1908	180	18	259	4,000	26	2 12prs.	3	..	25½
2 boats (31-32) ..	1908	178·6	18·75	287	4,000	26·5	2 12prs.	3	33	24½
2 boats (33-34) ..	1909	185	18·6	306	4,000	26	2 16prs.	3	..	23½
3 boats (35-36) ..	1909	177	17·9	298	4,000	26	2 12prs.	3	33	24

SUBMARINES.

Number.	Launched.	Dimensions. Length.	Beam.	Submerged Displacement.	Indicated Horse-power.	Speed. Surface.	Submerged.	Torpedo Tubes.	Complement.	Fuel.
		Feet.	Feet.	Tons.		Knots.	Knots.			Tons.
9 boats (Nos. A 5-A 13, 1903-4)	1904	150	..	204	600	16	9	2	..	..
10 boats (B Class) ..	1905	135	13½	313	600	13	9	2	..	15
10 boats(1905-6)C class	1906-7	135	13½	313	600	14	10	2	..	15
5 boats (1906-7)C12-16	1907-8	135	13½	313	600	13	..	2	..	15
1 boat (1906-7) D 1 ..	1908	..	..	595	1,200	16	10	3	..	..
2 boats (1906-7) C17 & C 18	1908	135	13½	313	600	13	..	2	..	15
2 boats (1907-8)C19-C 20	1909	135	13½	321	600	13	10	2	..	15
10 (1907-8)—										
C 21-C 24	1908	135	13½	321	600	13	..	2	..	15
C 25-C30	1909	135	13½	321	600	13	..	2	..	15
2 (1908-9) C 33-C 34 ..	1910	135	13½	321	600	13	..	2	..	15
7 (1908-9)—										
C 31-C 32	1909	135	13½	321	600	13	..	2	..	15
C 35-C 36	1909	135	13½	321	600	13	..	2	..	15
C 37-C 38	1910	135	13½	321	600	13	..	2	..	15
D 2	1910	..	..	..	..	..	..	3	..	..
2 (1909-10) D 7-D 8 ..	1911	..	..	604	1,200	..	..	3	..	..
4 (1909-10) D 3- D 6 ..	1911	..	..	..	..	..	..	3	..	..
2 (1910-1911) E 1-E 2..	1912	176	22½	800	1,600	15	..	3	28	..
4 (1910-11) E 3-E 6 ..	1912	176	22½	800	1,600	15	..	3	28	..
2 (1911-12) E 7-E 8 ..	1912	..	..	..	..	..	..	3	28	..
3 (1911-12) E 9-E 11 ..	1913-4	..	..	..	..	..	..	3	28	..
1 (1911-12) S. 1 ..	1914	..	..	..	..	..	..	..	..	..
20 building ..	..	..	..	..	..	..	..	..	..	..

AUSTRALIAN FLOTILLAS.

Name or Number.	Launched.	Dimensions. Length.	Beam.	Displacement.	Indicated Horse-power	Mean speed on Trial or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
TORPEDO-BOAT DESTROYERS.		Feet.	Feet.	Tons.		Knots.				Tons.
Yarra	1910	245¾	24¼	700	9,500	27	1 4in., 3 12prs	3	66	130
Parramatta ..	1910	245¾	24¼	700	9,500	28·48	1 4in., 3 12prs.	3	66	130
Warrego ..	1911	245¾	24¼	700	9,500	28	1 4in., 3 12prs.	3	66	130
Swan	Bldg.	Details not published.				..	..	..	..	..
Derwent ..	Bldg.	Details not published.				..	..	..	..	..
Torrens ..	Bldg.	Details not published.				..	..	..	..	..
SUBMARINES—										
A E 1-A E 2 ..	1914	176	22½	800	1,600	15	..	..	29	..

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